Software Reference Manual

for the iMetOS-II

METEOROLOGICAL OPERATING SOFTWARE

Unclassified

Prepared For

GENERAL DISTRIBUTION

By

INTERNATIONAL MET SYSTEMS

4767 Broadmoor Ave SE STE7
Grand Rapids, MI 49512

Commercial Entity Code: 1NG75

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LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

The abbreviations and acronyms used in this document are as follows:

°C – Degrees Centigrade
AFC – Automatic Frequency Control
atm – Standard Atmosphere
BMP - Bitmap
CDU – Control and Display Unit
°F - Farenheit
Ft – Feet
g – gram
kg - kilogram
GHz – Gigahertz
GMT – Greenwich Mean Time
GPS – Global Positioning System
GNSS - Global navigation satellite system
hPa – Hectopascal
inHg – inches of Mercury
ICAO – International Civil Aviation Organization
IP – Internet Protocol
km - kilometre
K – Kelvin
kts - knots
LCD – Liquid Crystal Display
m – metre
m/min – metre/minute
mb - millibar
Mb – Megabyte
MHz – Megaherz
mils – milliradians (unit of angle)
mmHg – millimeters of Mercury
mph – miles per hour
OEM – Original Equipment Manufacturer
oz - ounces
PC – Personal Computer
PDF – Portable Document Format
PTU – Pressure, temperature and humidity
RAM – Random Access Memory
RDF – Radio Direction Finding
s - Second
SPS – Signal Processing System

TCP/IP - Transmission Control Protocol/Internet Protocol

UAV – Unmanned Aerial Vehicle

UDP – User Datagram Protocol

USB – Universal Serial Bus

UTC – Universal Time Constant

UTM – Universal Transverse Mercator

WGS-84 – World Geodetic System (revised 1984)

WMO – World Meteorological Organization

Z – UTC hour

INTRODUCTION

This document describes the operation of the iMetOS-II Meteorological Operating Software. This software runs on the workstation computer that forms part of an upper-air meteorological balloon sounding system.

This document includes

- A description of each of the screens/forms in the software
- A description of the procedures to be followed for a balloon flight.

SOFTWARE VERSIONS

This document applies to version 3.133.1 of the software.

A full description of the changes that have taken place between version releases may be found on the iMetOS-II Help screen, under the Release Notes button.

Note that some software functions detailed in this document are applicable only to particular options of the software. The software option that has been installed is displayed in the last two digits of the "version", which is displayed in the start-up screen and on the Help screen.

Description	Option Number
Standard commercial software	00
Military software	01
Commercial software with DigiCora II message mimic	02
Military software with DigiCora II message mimic	03

Similarly, some software functions are applicable only to particular systems. There are distinct differences in ground equipment between InterMet's 1680 MHz system and the 403 MHz system. Applicable text is indicated in the document.

HARDWARE REQUIREMENTS

The software is installed on a workstation PC or tablet that is running the Windows (XP, Vista, 7, 8, 8.1, 10 or more recent) operating system.

The PC minimum requirements are:

- Pentium processor 2GHz or better
- 1Gb RAM
- 10Mb hard disk space (plus 5 to 15Mb per flight)
- 1024 x 720 screen resolution with 256 colours
- 3 USB ports (depending on peripheral equipment requirements)
- Mouse
- Internet connection (optional)

- Sound card and speakers (optional)

INSTALLATION

Installation is by means of a self-starting installation routine. The software will, by default, be installed into an OEM folder on the C:\ hard drive.

A program group is created to contain all of the executable files relating to the package. A desktop icon may also be created for quick access to the software.

Sounding data should be stored in an accessible folder on the local hard drive. Normally this would be configured as the \Data folder off the OEM folder under Public Documents.

CHAPTER 1
USER INTERFACE

1.1 <u>GENERAL</u>

The software, when initially run, displays a program information flash screen for a few seconds.   This includes the name of the software, version number and copyright information.

Should the software be run in the demonstration mode (see CHAPTER 2 below), this will be indicated in the title bar.

Figure 1-1: Opening Screen

The primary user interface with the iMetOS-II software is via a screen which contains static information areas.   The upper portion of the screen always displays a row of buttons.   These allow the user to select for display in the central portion of the screen various aspects of the system, controls and data.   The lower portion of the screen displays information on the sounding progress as well as real-time raw data.

The title-bar of the software includes the program name, version and the name of the screen selection that is being displayed.
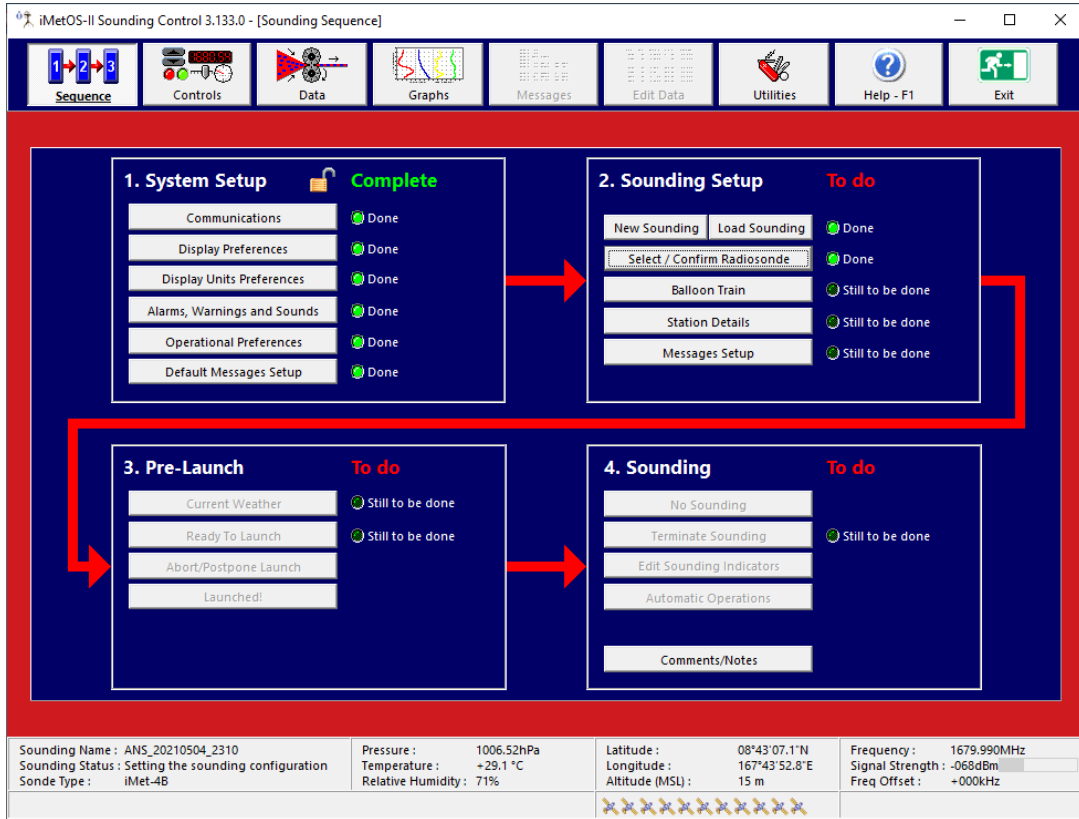
Figure 1-2: iMetOS-II Main Screen

1.2 <u>SCREEN SELECTION BUTTONS</u>

Figure 1-3: Primary Tool Bar

There are 9 screen selection buttons in the upper portion of the screen.   These are:
- Sequence – used to control the stages of a sounding, from initial configuration through to termination (Function Key F2)
- Controls – used to control the attached hardware (e.g. tracking antenna, receiver etc) (Function Key F3)
- Processed Data – displays the filtered and smoothed sounding data during an ascent (Function Key F4)
- Graphs – displays a range of graphs of the received data (Function Key F5)
- Messages – creates and displays a range of text messages that summarize the sounding. (Function Key F6)

- Edit Data – to be used for editing and reprocessing of data received during the ascent. (Function Key F7)
- Utilities – presents various utility screens (Function Key F8)
- Help – displays the splash screen and version information (Function Key F1)
- Exit – to quit from the program

1.3 STATUS DATA

The lower portion of the main screen is divided into 7 sections that display various types of ascent-related information.

Sounding Name : TEST	Pressure : 802.4hPa	Latitude : 42°53'13.4"N	Frequency : 402.009MHz
Sounding Status : Setting the sounding configuration	Temperature : +14.0 °C	Longitude : 085°32'00.4"W	Signal Strength : -079dBm
Sonde Type : iMet-1-ABx	Relative Humidity : 27%	Altitude (MSL) : 2025 m	Freq Offset : +0.1kHz
		✗✗✗✗✗✗✗✗✗✗✗✗✗✗	

Figure 1-4: Status Bar

The left-most block displays details about the sounding. It shows the sounding name (entered when creating a new sounding), the current status of the sounding (i.e. what is happening at present) and the radiosonde type that is being used.

The next block shows pressure, temperature and humidity (PTU) data, as received from the radiosonde. Before the launch, if no data is received from the radiosonde, the figures are replaced with dashes. Once the sounding is underway, the latest available data will be displayed.

The next block shows position information. If an RDF radiosonde is being used, the tracking station azimuth and elevation angles will be displayed. If a GNSS radiosonde is being used, the latitude, longitude and altitude are shown. As with the PTU data, the figures are replaced with dashes if they are not available during pre-launch, and display the latest available data during the sounding.

All data in the PTU and position information data blocks, above, will display "Wrong sonde!" if the transmitting sonde changes. (See 4.3 for details on how to accept data from a different sonde.)

The right-most block displays details of the receiver. It shows the tuned frequency, signal strength (in numerical and graphical form) and the frequency offset. The frequency to which the receiver is tuned may be set in the "Controls" screen.

Help hints are displayed in the panel at the very bottom left of the screen. These give more information on the currently selected control, or the control that is under the mouse pointer.

The block below the position information will, if using a GNSS radiosonde, display the number of satellites that are being used by the radiosonde to obtain its position. Coloured satellite icons show a satellite in use. Grayed satellite icons show where signals are being acquired, but lock-on has not yet taken place.

1.4 SCREEN SELECTIONS

Screen selections (i.e. the information displayed in the central portion of the screen) are made by clicking on the appropriate button in the upper portion of the screen. Buttons are enabled or disable as is applicable to each stage of a sounding.

The button for the currently selected screen is displayed as pressed, and its text is shown in a bold underlined font. The name of the currently selected screen is shown in the title-bar.

1.5 SEQUENCE

This screen is used to control the stages of a sounding, from initial configuration through to termination. The layout of the screen clearly guides the user as to the operations that are to be performed at any time during a sounding.
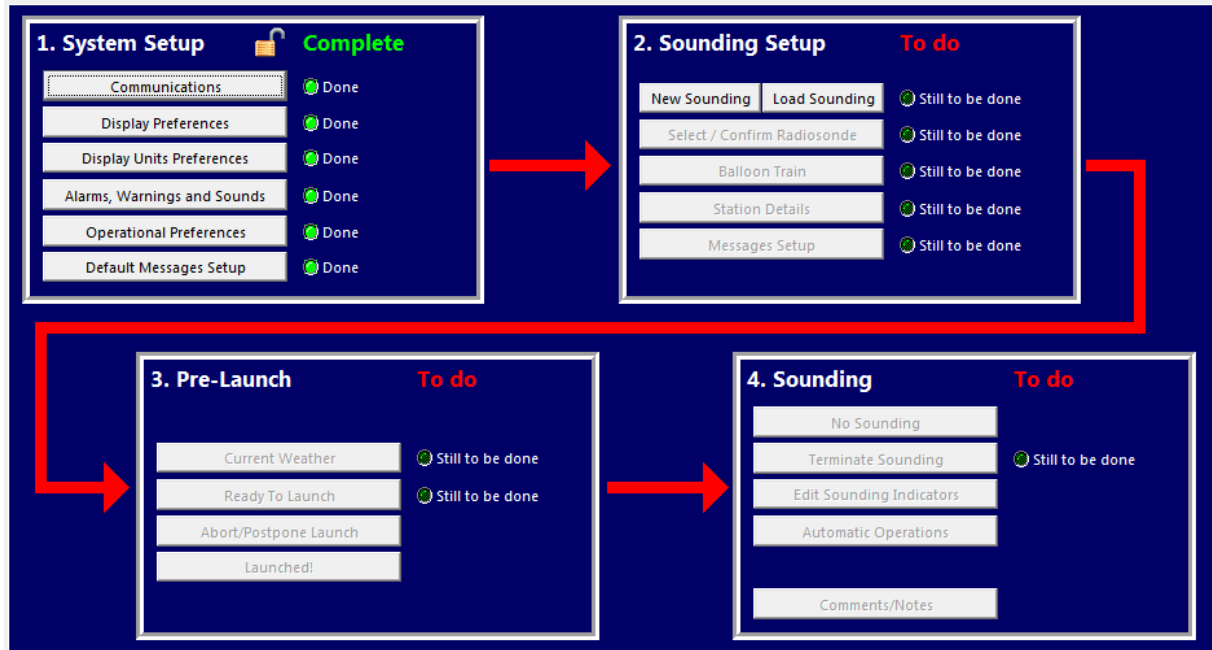
Figure 1-5: System Sequence

The stages of a meteorological sounding are grouped together into four clearly demarcated sections. These are the system setup, sounding setup, pre-launch and the sounding itself. Each of these sections includes various tasks (clickable buttons) that need to be performed. As each task is completed, it is marked as "Done" in the checkbox next to the task title. Once all of the tasks within a stage are completed, the stage itself is marked as completed, and the user may proceed on to the next stage. The task buttons are enabled or disabled, depending on the current status of the sounding.

Clicking on a task button will, in many cases, open a dialog form where user input or selections are required. These should all be filled in before the task will be marked as completed.

CHAPTER 2
DEMONSTRATION MODE

iMetOS-II may be operated in Demonstration Mode. This mode is especially useful for demonstating the abilities of iMetOS-II as no System Setup is required and no connected antenna is needed. It is not possible to make new soundings when the software is run in the Demonstration Mode.

A special demonstration installation package is available that creates a shortcut (under All Programs / InterMet / iMetOS-II / Software Demonstration) to open iMetOS-II in Demonstration Mode. Some sample soundings are also installed with this package installation.

Demonstration Mode thus provides a means to quickly get the system configured to display soundings. It will cause the initial System Setup operations (as outlined in CHAPTER 3) to be skipped. The user will be immediately presented with the option to load a previously completed sounding (see Section 4.2 below) All system setup parameters will be set to their default values and the System Setup will be marked as "Complete". These settings may be changed at a later time, if desired.

CHAPTER 3
SYSTEM SETUP

3.1 GENERAL

This is the first section that should be completed before a sounding is made. It handles the configuration of the installation on the workstation computer as well as the preferences made at an administrative level for sounding operation and message configuration. In order to make changes under System Setup, a user should be logged in at a Manager level or higher. (See section 12.5 Access Control).

The ability to modify the items under this section is shown by the state of a padlock image in the System Setup box. Users that are logged in at Manager level or higher may view the settings under this section, but may not modify them. System setup is usually completed when the hardware is first configured and does not have to be repeated unless changes are made.

Figure 3-1: System Setup Screen

3.2 COMMUNICATIONS

This task displays a dialog box that provides selections for the configuration of data communications between the work station and other devices. Four sections are provided, namely Equipment Used, Email, Distribution Channels and Automatic Messages.

This task will be considered completed when ground equipment and valid COM port selections have been made (see Section 3.2.1 Antenna).

3.2.1 Antenna

This section is used to indicate the type of peripheral hardware (Antenna equipment) that is being used, and the COM port/s to be used to communicate with this equipment.
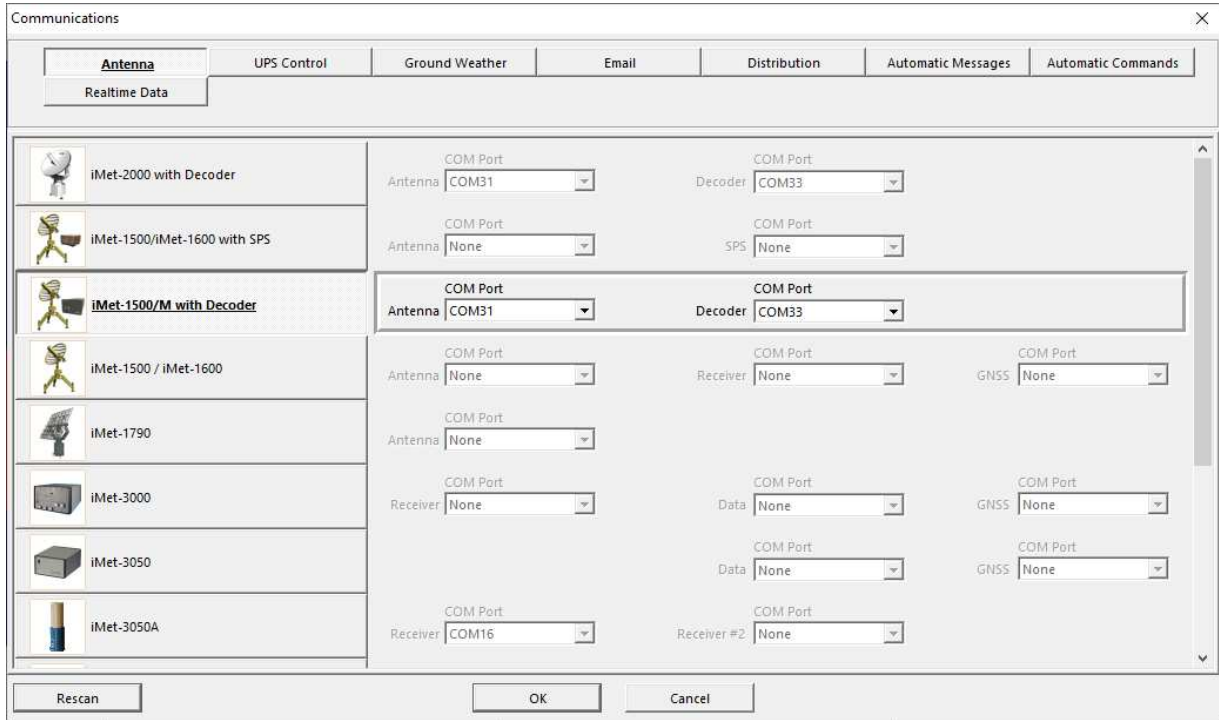
Figure 3-2: Hardware Communications Setup

The range of available antenna types is shown. The antenna type that is to be used should be selected. Thereafter, the COM port/s (and options) that are to be used should be selected.

Note that the setting up of the equipment to be used may only be made before starting a sounding (See CHAPTER 4).

3.2.2 UPS Control

If present, an APC UPS output status may be controlled. This UPS connects to the PC via a serial port, which is configured in the UPS Control form, shown below. Note that a UPS is an optional item – it is not present in most systems.
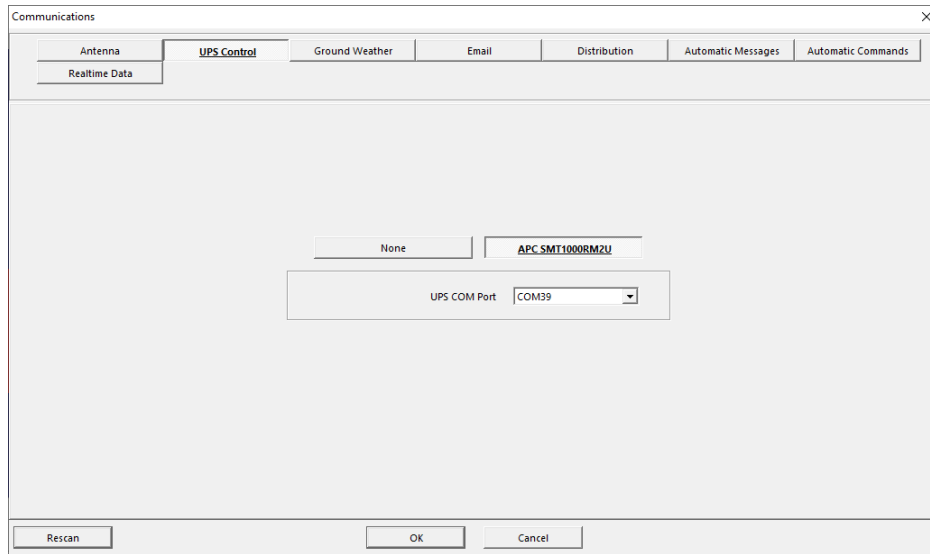
Figure 3-3; UPS Selection and Configuration

3.2.3 Ground Weather

Various systems are available for automated ground weather entry.   If one of the supported systems is installed, the interface details should be specified here. If you are using an automatic surface observations system that is not supported, please contact InterMet.
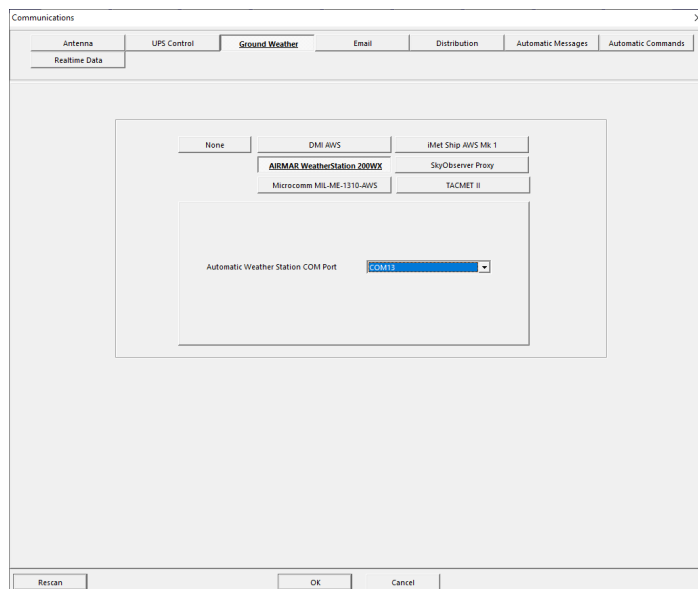
Figure 3-4: Automatic Ground Observations Configuration

3.2.4 Email

The Email section handles the configuration of a SMTP server's details and the formatting of manually generated email messages (as would be sent from the Messages screen (See CHAPTER 10).

Figure 3-5: E-Mail Setup

The SMTP server connection details are, in all likelihood, the same as those used in the account configuration of the computer's normal email client software (i.e. Thunderbird, Outlook, Outlook Express etc)   A "Test" button is included to ensure that the configured settings are acceptable to the server.

The subject line, body and attachment details of an email that is sent from the Messages screen can be configured.

A default subject line and a default body may be created using normal text and fields (text enclosed in square brackets).

Fields are text enclosed in square brackets that are replaced by sounding-specific data when the email is sent.   Available fields are:

[stn] : The descriptive station name, as entered in the Station Details form

[snd] : The sounding name

[msg] : The entire text of the message

[dat] : The name of the message being sent

[wmb] : The WMO Block number of the station

[wmn] : The WMO station number

[lddd] : The abbreviated day of week of launching (Mon .. Sun)

[ldddd] : The day of week of launching (Monday .. Sunday)

[lddddd] : The short date format of the launching

[lddddddd] : The long date format of the launching

[ltt] : The short time format of the launching

[lttt] : The long time format of the launching

[lhh] : The hour of the launching

[sddd] : The abbreviated synoptic day of week of the sounding (Mon .. Sun)

[sdddd] : The synoptic day of week of launching (Monday .. Sunday)

[sddddd] : The short date format of the synoptic day of the sounding

[sdddddd] : The long date format of the synoptic day of the sounding

[stt] : The short time format of the synoptic time of the sounding

[sttt] : The long time format of the synoptic time of the sounding

[shh] : The hour of the synoptic time of the sounding

The message itself can be sent as an attachment to the email, or as part of the body (via the [msg] field shown above).   All binary messages (e.g. BUFR) will be sent as attachments.   Any use of the '[msg]' field with binary messages will be ignored.

3.2.5 Distribution Channels

The Message Distribution section handles the configuration of ports that are used for the distribution of messages.   Generated messages can be sent out on UDP, TCP/IP, COM ports or XML proxy server.   The preferred method of distribution should be selected.

The IP address displayed for UDP and TCP configuration is the IP address of the workstation computer.

Various common message formatting options are included under the "Format" section.
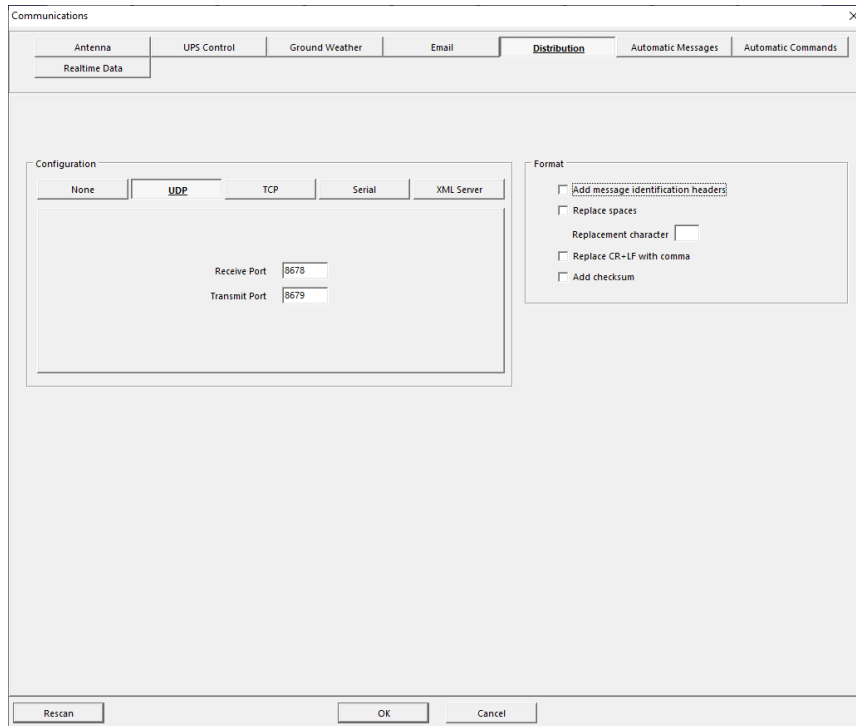
Figure 3-6: Message Distribution Configuration

3.2.6 Automatic Messages

During a sounding (at the 100hPa level) and at sounding termination, messages can be automatically generated and transmitted.   Automatic transmission of selected messages may take place via FTP, email or the configured distribution channel.
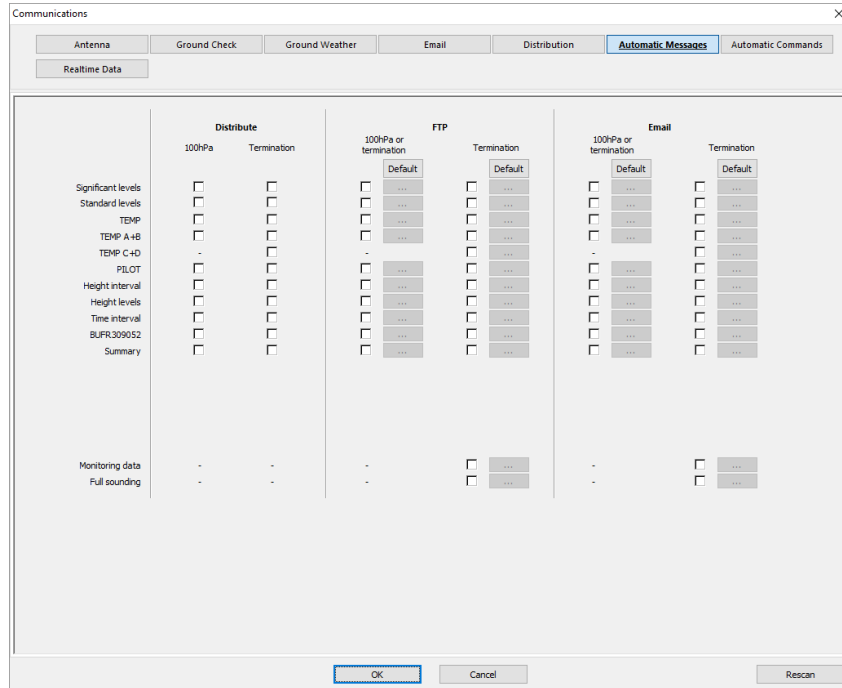
Figure 3-7; Automatic Message Configuration

This section handles the configuration of which messages are to be automatically generated and transmitted by FTP, email and/or the selected distribution channel.   The default FTP and email controls may be specified for the 100hPa and termination messages.   Individual messages may be selected for generation, and their transmission details may either follow the default settings, or be individually configured (as shown in the two screens below)
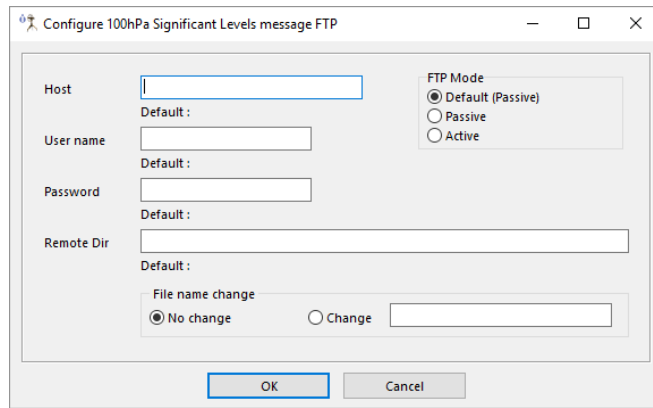
Figure 3-8: FTP Message Transfer Configuration
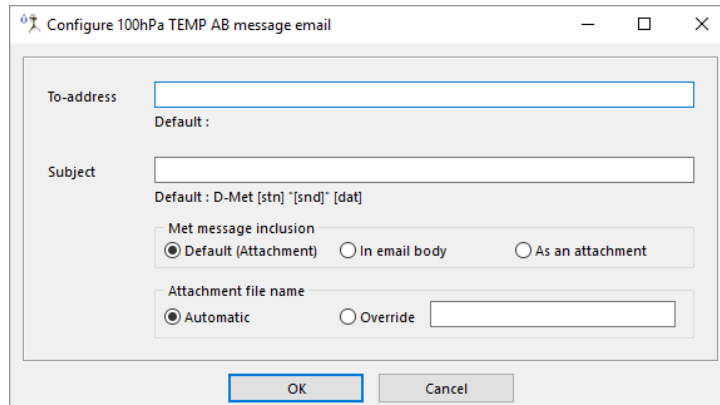
Figure 3-9: Email Message Transfer Configuration

Multiple To-addresses may be specified for the messages.   These should be separated by semi-colons or commas.

Subject line content is specified in the same way as detailed in Section 3.2.4 above (with the [msg] field being ignored).   Note too that binary messages are always sent as attachments to the email.

Attachment file names are either as generated automatically (according to the configuration in Section 3.7 below) or may be manually overridden with the file name entered here.   The manual override filename may include variable fields, as detailed in Section 3.2.4 above (with the [msg] field being ignored). Warning: the use of the full time fields may result in file names that include invalid characters (e.g. ':'). Should the override name be an invalid file name, the automatic name will be substituted.

Two additional automatic emails may be configured here.

- The Monitoring Data email is used to keep check on sounding results.   Sounding Monitoring software, a separate software package, is available to assist with this task.   If the station installation is on a permanent internet connection, it is requested that a To-address of dmet@diel.co.za should be configured for Monitoring Data.
- The Full Sounding Data email will send a zipped file (archive) of all data that was received and generated during the sounding.   This is vital for in-depth post-flight analysis.

3.2.7 Automatic Commands

This section allows for the configuration of automatic commands to be executed following termination of a sounding.   The commands are executed after completion of generation of all sounding messages and the servicing of all email and FTP operations.

The commands are specified by indicating the command (program) to be executed (full path and program name to be typed in), parameters and whether the program should be run normalized ('1') or maximized ('2') or minimized ('3').

Parameters may include the same field definition strings as indicated in Section 3.2.4 above.   In addition the filenames of the generated messages may be accessed using the fields

> [fnXXXX] – The file name of the message type XXXX

[pfnXXXX] – The path and file name of the message type XXXX

where

XXXX may be

'Summary',	'SigLevels',	'StdLevels'
'TEMP',	'TEMP AB'	'TEMP CD',
'PILOT',	'Physical HS',	'Physical HL',
'Physical TS',	'B2',	'B3',
'CM',	'TA',	'SR',
'FM',	'SR',	'UAV',
'METEO11',	'DigiCORA',	'KML',
'EDT',	'BUFR309050',	'BUFR309051',
'BUFR309052',	'BUFR309056',	'RAOB CSV',
'SHARPpy'		

For example :

Command :

cmd

Parameter/s :

/C COPY "[pfnTEMP]"+"[pfnPILOT]" "Z:\Transfer\[stn]_[snd]_TPCombined.msg"

This will join (concatenate) the TEMP and PILOT messages into a single file.   The file will be named as the station name, followed by the sounding name, followed by "TPCombined.msg" (separated by underscores) in the Z:\Transfer folder.   Note the use of double inverted commas, to ensure that any long file names are correctly handled.

3.2.8 Realtime Data

During a sounding, the software will make available an ASCII file containing real-time, processed data. The file is named "RTProcData.pdt" and is stored in the soundings folder i.e. the folder indicated in 3.6 Operational Preferences.   This file will increment in size by one line per data sample (1 second).   The data content of the line and the data separators may be configured in the form shown below.
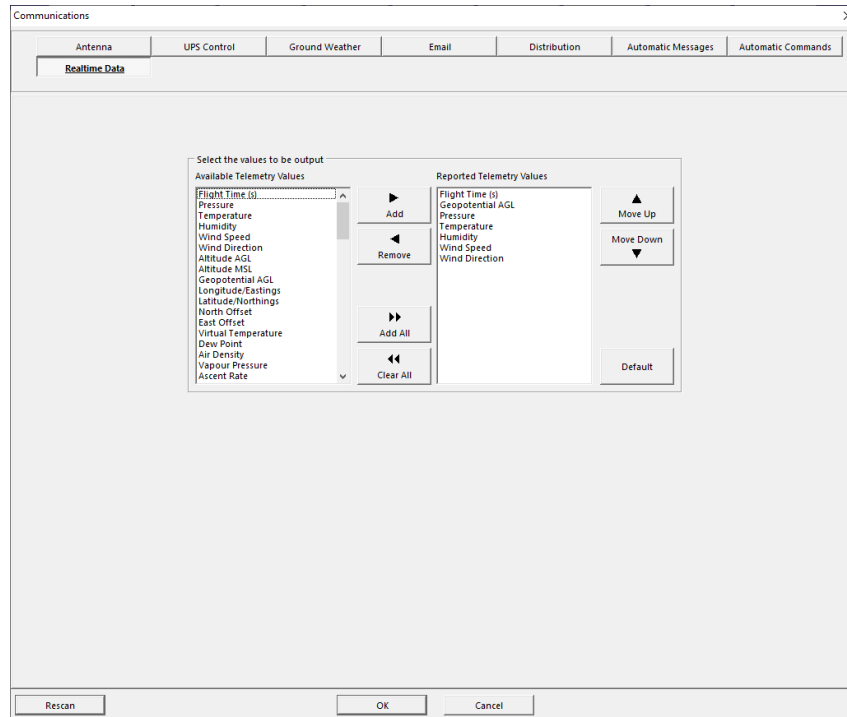
Figure 3-10 : Realtime Data Configuration

3.3 DISPLAY PREFERENCES

This task displays a dialog box that permits the setting of various preferences for graphs and colours and display.

The user need simply view and accept the settings for this task to be flagged as completed.
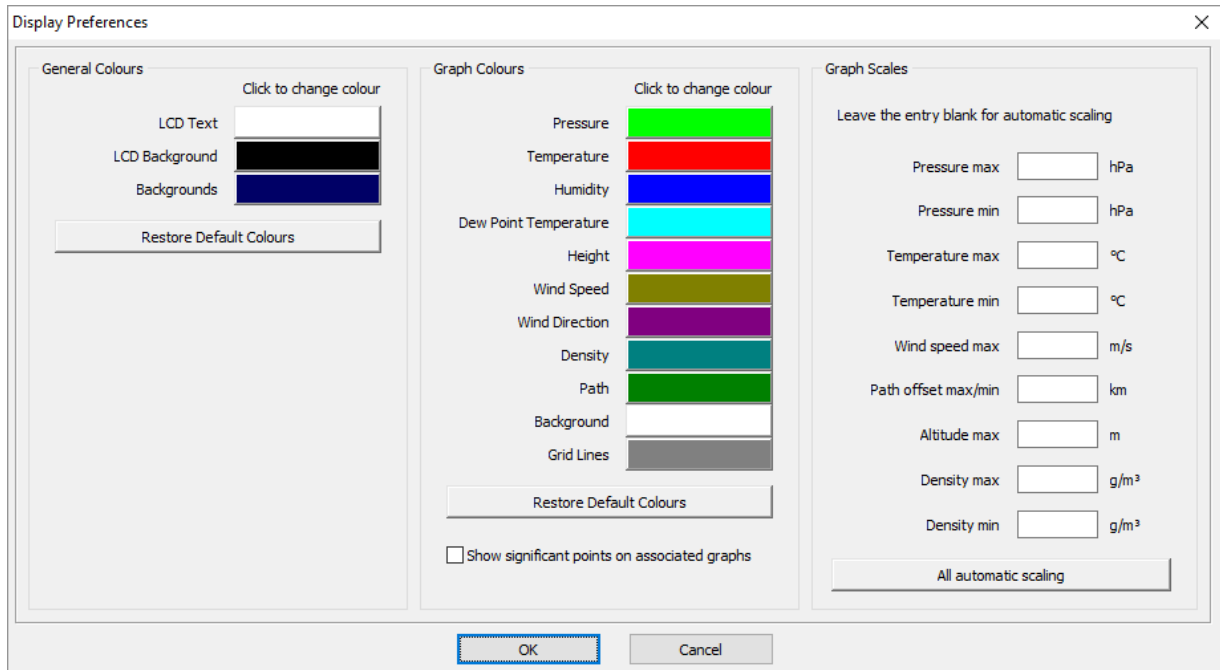
Figure 3-11: Display Preferences

There are three sections of configuration provided in this screen.

3.3.1 General Colours

In this section the colour of the LCD-mimic displays (visible in the
Ground System Controls and
Data screens) and the general program background colour may be set.

3.3.2 Graph Colours

In this section the colours used to plot data in various graphs, as well as the graph background and grid colours may be set.

The option to include associated significant points on a value graph may also be made here.　If checked, the temperature graph will (in addition to the normal temperature significant points) include markers for the humidity significant points.　Similarly the humidity graph will include markers for the temperature significant points.　The same pairing will happen with wind speed and wind direction.

3.3.3 Graph Scales

In this section the minimum and maximum values that are shown on various graphs may be set.　Inserting values here has the effect of fixing the graph axis (and hence the data magnification).　If no values are inserted, the graphs are automatically scaled to always display all of the data.

3.4 DISPLAY UNIT PREFERENCES

This task displays a dialog box that permits selection of the preferred units for display and entry of data. Positional location, angles, pressure, temperature, height/altitude, wind speeds and distance may be adjusted for display in a range of units.
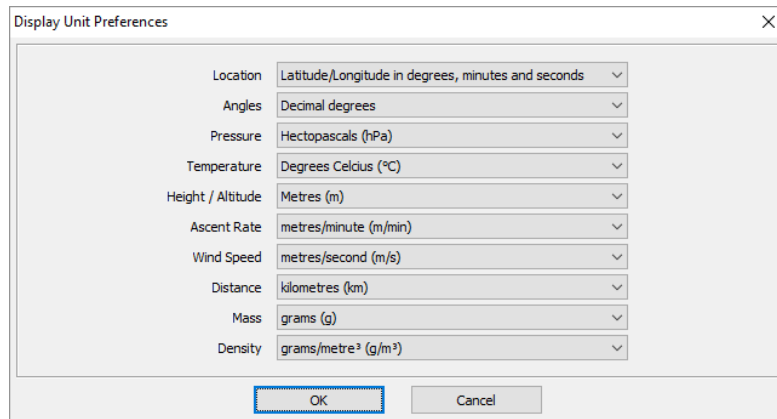
Figure 3-12: Display Unit Preferences

The user need simply display and accept the settings for this task to be flagged as completed.

Available options described in Table 3-1.:

Table 3-1: Unit Preference Options

Location	Pressure
Latitude and longitude in degrees, minutes and seconds	Hectopascals
Latitude and longitude in degrees, decimal minutes	Millibars
Latitude and longitude in decimal degrees	Atmospheres
UTM (WGS84)	Inches of Mercury
UTM (Clark 1880)	Millimetres of Mercury
UTM (Clark 1866)	
UTM (Bessel 1841)	
Angles	Height / Altitude
Decimal degrees	Metres

Mils (6400 or 6000)	Feet
<u>Distance</u> Metres Kilometres Miles Nautical miles Feet	<u>Wind Speed</u> Metres / second Knots Kilometres per hour Miles per hour
<u>Temperature</u> Centigrade Fahrenheit Kelvin	<u>Density</u> grams/metre3 kilograms/metre3 ounces/foot3 ounces/yard3
<u>Ascent Rate</u> metres/minute metres/second feet/minute feet/second	

Note: The WMO accepted units for pressure is hectopascals, for temperature is degrees centigrade, for wind speed is metres/second or knots.

3.5 <u>ALARMS, WARNINGS, AND SOUNDS</u>

This task displays a dialog box that permits configuration of the sounds that are played during various events in program operation.   Ascent schedule warnings may also be set up.   In general, the user need simply display and accept the settings for this task to be flagged as completed.

The sounds (.WAV files) are played over the PC's sound system for various software events.

The operator warnings are timed reminders to prepare and launch a balloon at a particular time.

3.5.1 <u>Sounds</u>

The Sound configuration page displays the various software events to which sounds may be attached.   It is recommended that all sound alarms be activated with the default sound files.

The events for which a sound may be played are:

- Balloon Launch – The selected sound is played once the ascent of the balloon has been noticed. Note that this may be some time after the balloon has actually left the ground and also some time before data processing begins.
- Antenna Data – The selected sound is played at a maximum rate of once per second, for every second in which data is received from a tracking antenna.
- Radiosonde Data – The selected sound is played at a maximum rate of once per second, for every second in which data is received from the radiosonde.   PTU data should be received as well as GNSS data, if the radiosonde provides this.
- Missing Data – The selected sound is played at a maximum rate of once per second, for every second in which antenna, receiver or radiosonde data is not received.   Playing of the sound only commences following two consecutive seconds of missing data.
- Flight Ended – The selected sound is played at the termination of the flight (manual or automatic)
- Device Off-Line – The selected sound is played at a maximum rate of once per second, for every second in which there is a communications error with the tracking station or SPS.
- Ascent Warning – The selected sound is played when an ascent schedule alarm is raised, to warn the operator that a scheduled sounding should be prepared.
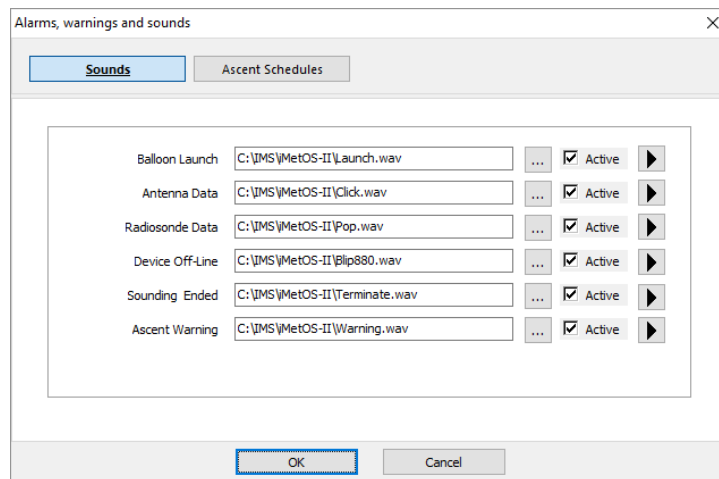
Figure 3-13: Audible Warnings

3.5.2 Warnings

The warnings, under the page named "Ascent Schedules", allow configuration of warnings to be produced when the operator is required to begin preparation for a scheduled balloon launch.

The selection may be "no warnings", a "fixed time warning" (where warnings are generated a specified period of time before any of a set of pre-defined launch times) or "Met Day warnings" (which are based on the Met Day periods, as described under 12.4.2 Met Day, below)
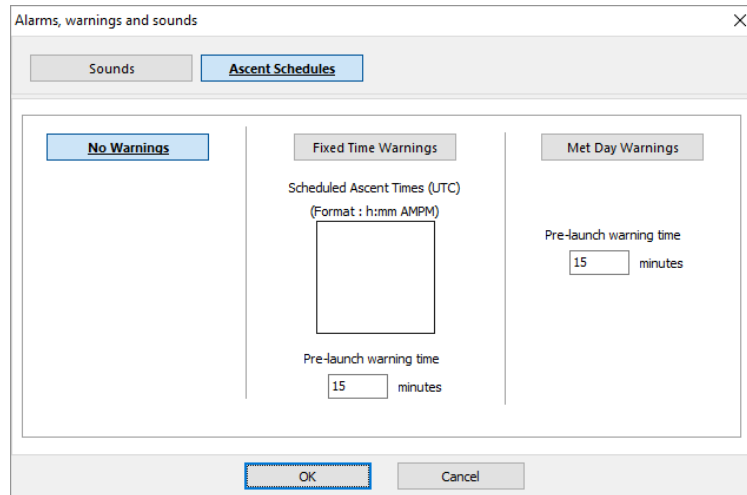
Figure 3-14: Warning Types

3.6 OPERATIONAL PREFERENCES

This task displays a dialog box that permits setting up of various system parameters that control the operation of the software and of a balloon sounding.   These are grouped into Sounding Name, Automatic Events, Time and Timing, Station and General.   Configuration of items in each of these groups is carried out on a sub-screen of the Operational Preferences form.

Figure 3-15 : Operational Preferences - Sounding Name

The Sounding Name sub-screen is used to control the hard disc location and naming of soundings.   In order to shield the operator from having to deal with hard disc organization, each sounding is named and stored in a folder in the Sounding data location (as specified here).   The ellipsis (…) button is used to navigate on the hard drive, and make a selection.   It is recommended that the default folder, which is in the Windows Public Documents folder, be used.

The format of the name, and even automatically generated names, may also be specified.   If an entry is made for the Sounding name format, this will be displayed as a guide for each time a new sounding is begun.   If any of the following character sequences are included in the sounding name format, they will be replaced as shown when an automatic name generation is requested:

- [yyyy]   -   Replaced by a 4-digit year
- [yy]   -   Replaced by a 2-digit year
- [mm]   -   Replaced by a 2-digit month
- [dd]   -   Replaced by a 2-digit day
- [hh]   -   Replaced by a 2-digit hour (24-hour clock)
- [nn]   -   Replaced by a 2-digit minute
- [f]   -   Replaced by a flight number (number of digits is configurable)
- [r]   -   Replaced by a release number (number of digits is configurable)

Note: [hh] is replaced by the closest hour if [nn] is not included in the name generation. Synoptic date/time (and closest configured Synoptic time – see 3.7) can also be selected.
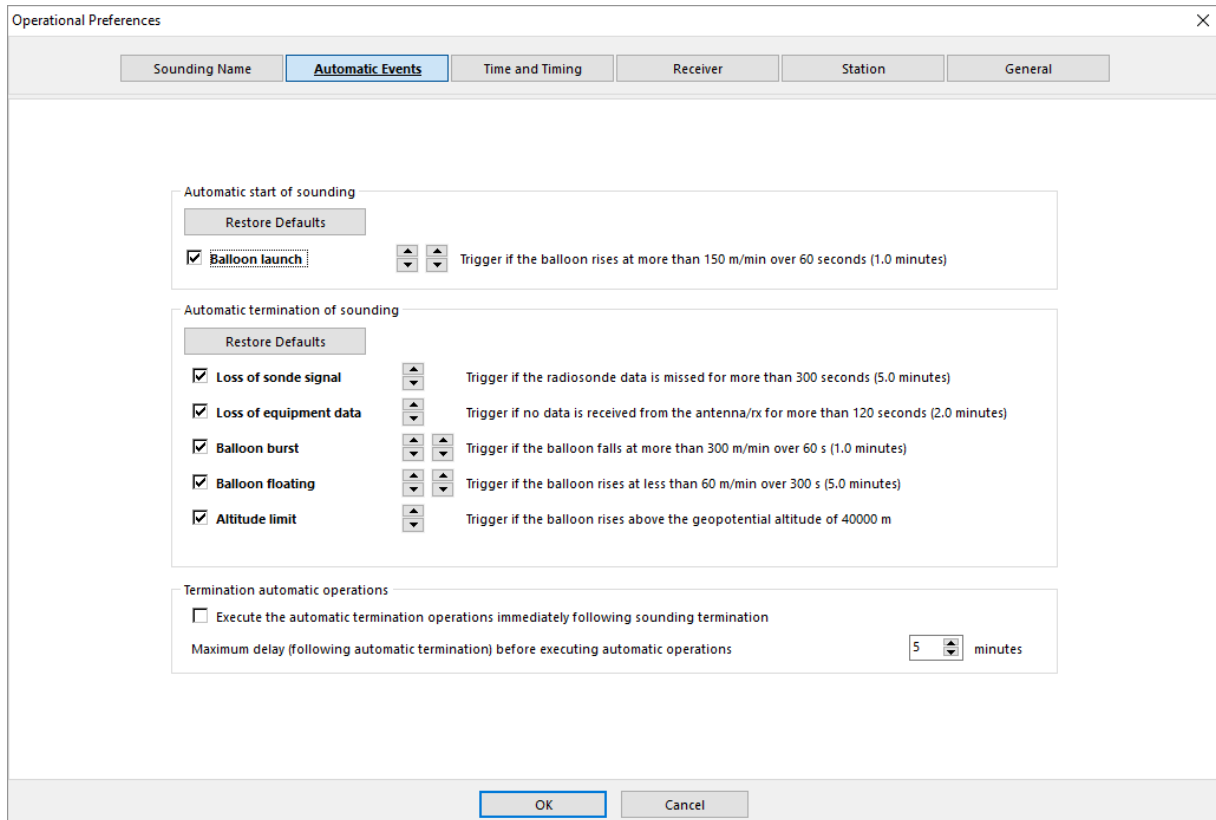
Figure 3-16 : Operational Preferences - Automatic Events

The Automatic Events sub-screen configures various items that may occur automatically during the sounding process.

The parameters that control the automatic starting of a sounding are configurable. This detection may be turned on or off in the checkbox, and the parameters that define the trigger rate of rise and the time period over which this rate of rise should be maintained may be specified. If automatic detection of balloon launch is turned off, a "Launched!" button will be displayed on the Sequence screen after the "Ready To Launch" task has been completed.

The parameters that control the automatic termination of a sounding are configurable. There are five possible ways that a sounding may be automatically terminated:

- consistent loss of telemetry data from the radiosonde,
- consistent loss of communication with the antenna/receiver,
- falling of the balloon (normally due to balloon burst),
- slow rise of the balloon (which may be due to insufficient gas, icing, or leaking) and
- achieving a specified altitude.

Each of these methods of balloon termination may be individually enabled or disabled. Note that manual termination may be required, depending on the configuration of these operations. The two loss of signal/communication conditions may be configured for the minimum consecutive data loss time that would trigger a sounding termination. The balloon ascent monitoring may be configured for the rate of rise as well as the time period over which this rate of rise is determined. Note that the balloon burst configuration is for a rate of fall.

How the system handles post-termination automatic operations (message creation, transmission and automatic commands) may also be configured. Selecting that these happen immediately following termination means that the messages will be generated and sent with the received data i.e. without any option for initial data editing. The data may, however, be subsequently edited, and the messages resent manually. The delay to automatic operations is to ensure that stations where the PC may be unattended at the end of the sounding will, after some delay, send out the configured messages.
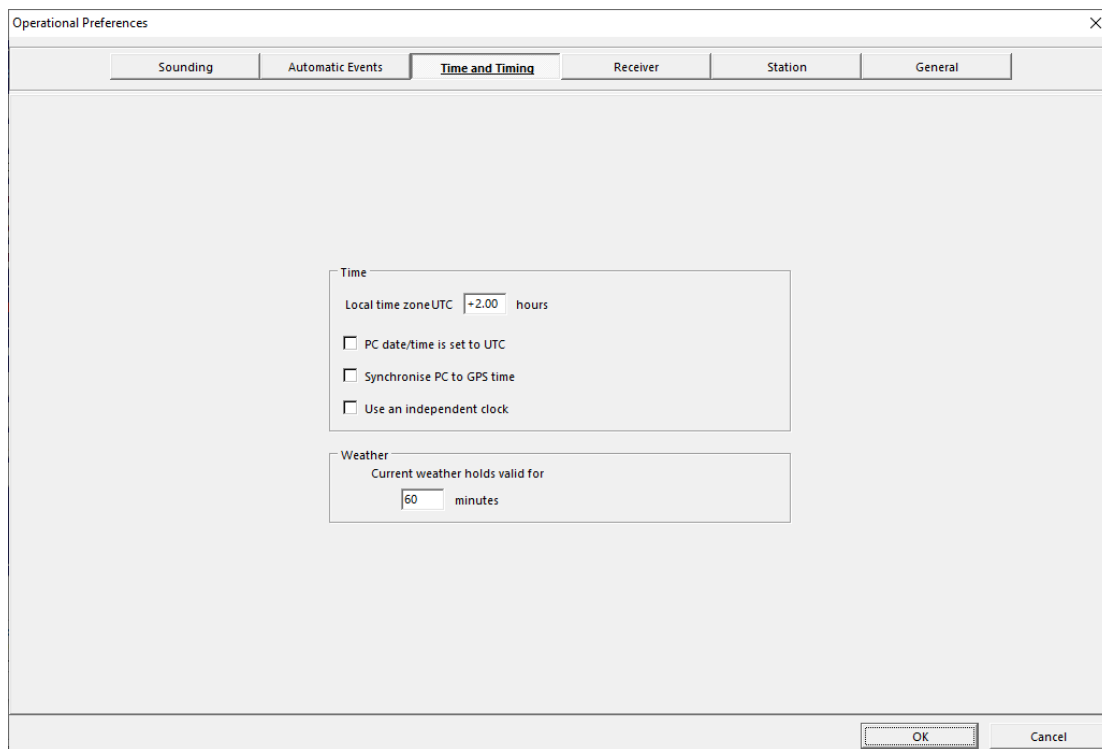
Figure 3-17 : Operational Preferences - Time and Timing

The Time and Timing sub-screen configures various items that control the clock and time-related activities.

The Local time zone UTC offset time is initially pre-filled from the PC's time zone information. If the PC has been set up correctly, this figure should not require modification. The user should, however, confirm that it is correct. It is a strongly advised that the PC's time zone be set correctly (under the Date and Time icon in the Windows Control Panel)

The software may be configured to optionally adjust the date and time of the PC to match that reported by

the ground equipment, should this be able to provide satellite-originated UTC date and time. This correction, if selected, will only be carried out once during each software session, and then only when GNSS data is first received from the ground equipment. The correction will only be made if the time difference between the PC and the ground-equipment-reported time is less than 2 hours. Time corrections for differences of more than 2 hours are deemed to require human intervention and judgment as to the reason for such a large offset.

The system may be configured to run an independent clock, which would be used for timing operations during a flight. Instances have occurred, where the PC's clock/calendar is altered by a user or network time server during a flight. This may lead to erroneous data, particularly in wind calculations. Selecting the independent clock will remove the likelihood of this happening. It will, however, remove any firm link with any other date/time stamps in software that may also be operating on the PC. Drift on the independent clock may be as much as 5 seconds in an hour, which is insignificant for the operation and data output of the software.

The weather duration setting indicates the maximum permissible time between the entry/acceptance of the weather/ground readings and the launch of the balloon. This is to help ensure that the conditions that are entered in the "Current Weather" task (under the Pre-Launch section) are still valid when the balloon begins its ascent.
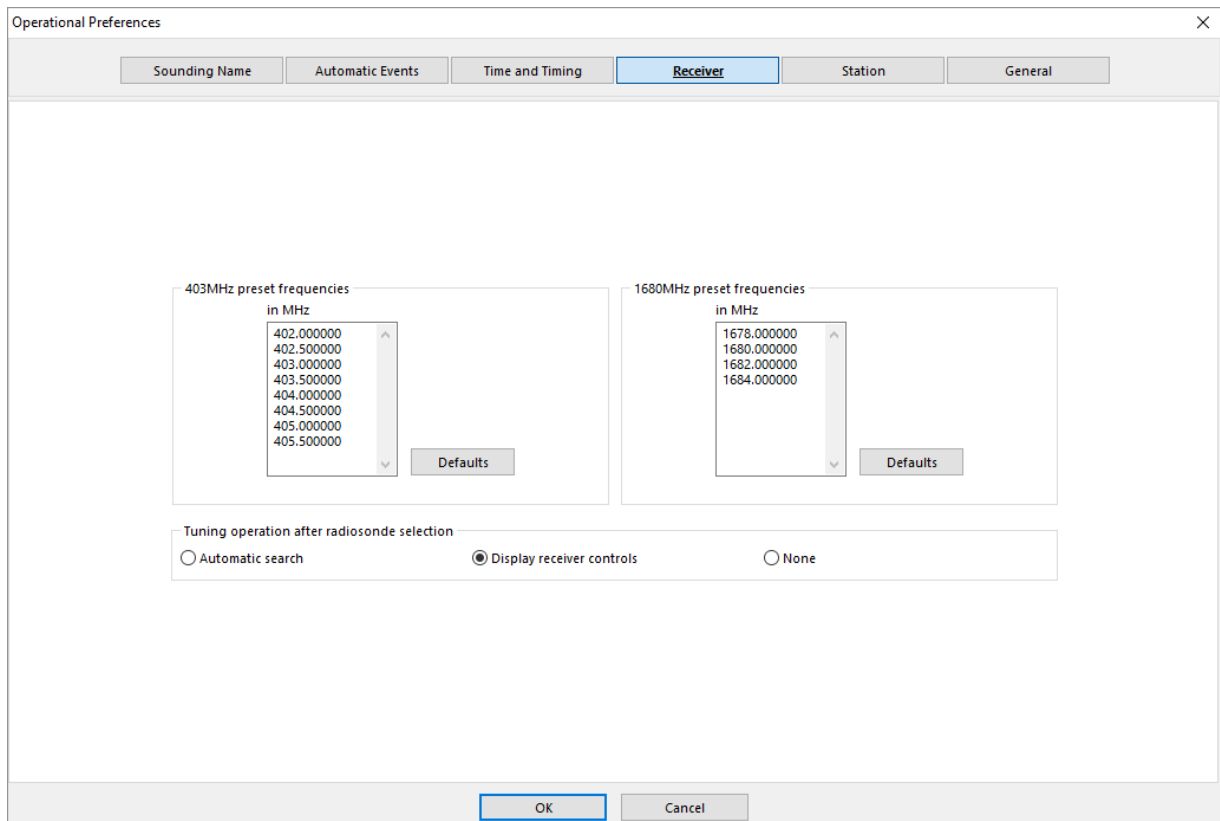
Figure 3-18 : Operational Preferences – Receiver

The Receiver sub-screen permits the configuration of custom preset receiver frequencies.   Normally, these will be set to the frequencies that are assigned to the preset frequencies on the radiosonde in use.   In some cases, especially where multiple radiosonde types are in use, it may be useful to make use of the configuration options here, to select a wider range of quickly-accessible preset frequencies.

In addition, there is also an option that assists with tuning to the radiosonde signal during sounding setup.   Automatic search will cause the receiver to periodically scan the band for a strong radiosonde signal, whereafter it will select the signal.   Alternatively, the configuration may be set to open the antenna control screen following radiosonde selection.   This is a prompt to the user to carry out manual tuning to the Radiosonde signal.   The third option will result in no action.

Figure 3-19 : Operational Preferences - Station

The Station sub-screen configures the type of station installation and which items might be needed for entry.

Choice of Civilian or Military and Fixed, Mobile or Ship installations, will indicate, in other entry screens, which items should be visible and which data entries are required.   The location of the station, as is required in most met message reports, may be selected to be automatically extracted from the location data that is available from the ground equipment.

Various station and operatator identifiers may be flagged as required for sounding setup.

Figure 3-20 : Operational Preferences - General

The General sub-screen configures sundry other items.

The 9-character combined NWS Cloud/Current weather indicator may be selected, in preference to the WMO-compliant separate 5-digit cloud code and 4-digit weather code.

The language selection permits switching between supported languages.   Text on all controls in the software will change to the selected language.   At present, only English is supported.

Post-data entry permits or bars the user from editing the sounding data that is used for the creation of the output messages.

The start-up splash-screen with product name and version may be optionally disabled.

The RAOB installation may be changed if the RAOB third-party software is installed, but is not at its default location.

3.7 DEFAULT MESSAGE SETUP

This task displays a dialog box that permits setting up of the many parameters that control the content and construction of the text messages that may be created from the sounding data.

The buttons at the top of the form are used to display the items for configuration in each of the message

types.
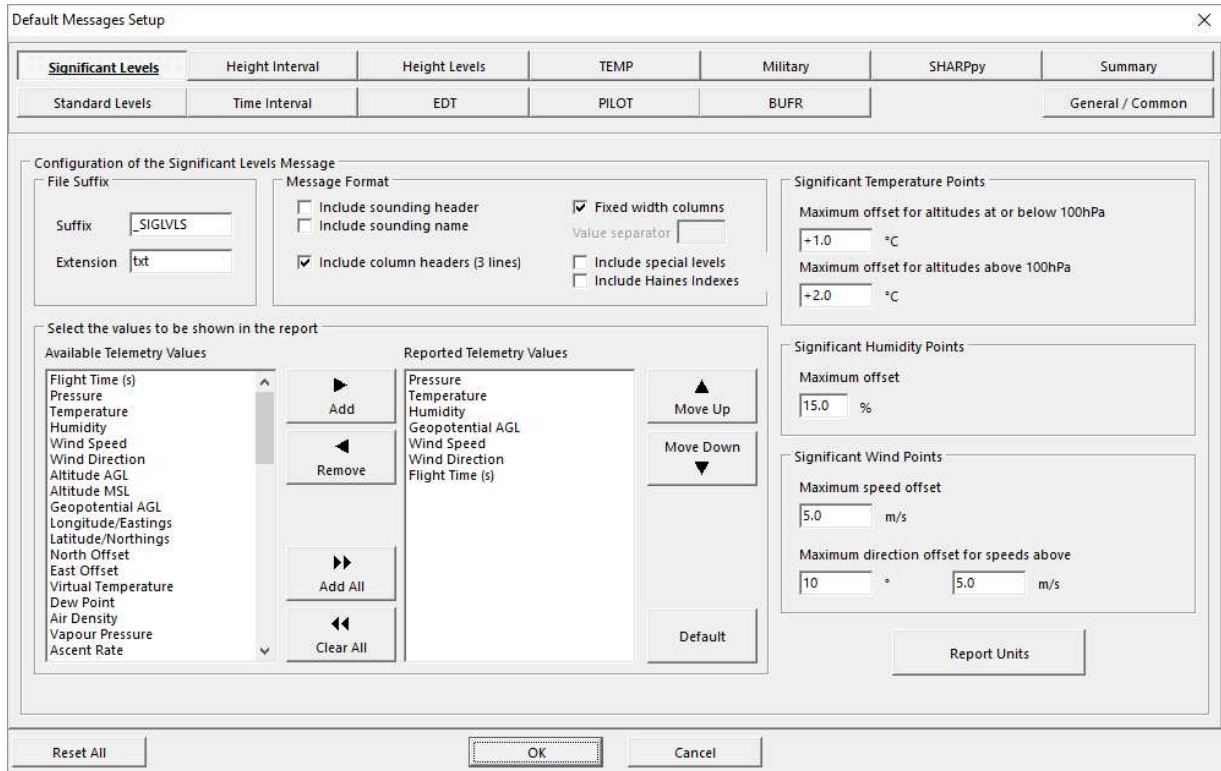
Figure 3-21: Message Setup

Following creation (automated or manual), messages are saved to the sounding folder on the hard disc. Depending on the message type, text or binary files will be created.

Text messages are saved with as DOS-compliant text files, with the extension ".txt". Each message configuration form includes a section for setting the suffix of the file name for that particular message. The message file names are of the format AAABBB.txt, where AAA is the sounding name and BBB is the suffix.

Binary messages are saved as raw data, with the extension specified in the corresponding message configuration form.

For any message, should the associated file already exist on the hard disc, with a set read-only attribute, the message file will not be overwritten. Rather the contents of the read-only file will be loaded and used as the message output.

The tabular messages (Significant Levels, Standard Levels, Height Interval, Height Levels and Time Interval) each contain a section that controls the telemetry value columns that are to be included in the reports. The data columns that may be included are shown under "Available Telemetry Values". These may be selected and placed in the required order under the "Required Telemetry Values". The available telemetry values include:

Table 3-2: Available Telemetry Values

• Time (in seconds, hh:mm:ss or mm ss, from launch)	• Mid-Level temperature
• UTC and Local date of data sample	• Mid-Level pressure
• UTC and Local time of data sample	• Mid-Level density
• Pressure	• Mid-Level standard pressure
• Temperature	• Mid-Level Standard Atmosphere temperature
• Humidity	• Mid-Level Standard Atmosphere density
• Longitude and latitude	• Delta Standard Atmosphere temperature
• Geometric altitude above ground level and above seal level	• Delta Standard pressure
• Geopotential above ground level and above sea level	• Delta Standard Atmosphere density
• North and east offset from launch site	• Level-averaged Delta Standard Atmosphere virtual temperature
• Wind (speed, direction, north and east components)	• Level-averaged Delta standard pressure
• Virtual temperature	• Level-averaged Delta Standard Atmosphere density
• Dew point	• Level-averaged winds (speed and direction)
• Air density	• Ground and slant ranges
• Vapour pressure	• Azimuth angle between antenna and radiosonde
• Ascent rate	• Elevation angle between antenna and radiosonde
• Mid-Level geopotential	• Mixing ratio
• Height:Layer thickness ratio	• Saturation vapour pressure
• Standard Atmosphere temperature	• Solar angle
• Standard pressure	• Solar temperature corrections
• Standard Atmosphere density	• Ozone pressure (Ozone radiosonde only)
• Standard virtual temperature (Meteo11)	• Anasphere Supercooled Liquid Water Content frequency (ASLWC radiosonde only)
• Level winds (speed, direction, north and east components)	

Note that

- the Time Interval report will always include the Time telemetry value in the first column,

- the Height Interval and Height Level reports will always include the Geopotential AGL or Geometric height in the first column (depending on the Interval Value selection made), and
- the Standard Levels report will always include pressure in the first column.

All of these above values will be automatically inserted if the user does not configure them as required.

In certain messages, the above telemetry values may be configured to appear in fixed width columns or in (packed) lines with a specified separator.

The units of measure used in tabular reports may be different from those displayed on the screen during software operation.   They may also be configured on a report-by-report basis.   A "Reports Units" button is available in each tabular report setup form for this purpose.

Height Level and Height Interval messages may have an optional modification to the Standard Atmosphere pressure figures, to change it from a sea level value of 1013.25hPa to 1000hPa.

Haines Index values may be optionally included at the end of the Standard and Significant Levels messages.

Various messages to include headers and footers. These may be required for message routing. If any of the following character sequences are included in the header/footer, they will be replaced as shown when a message is created:

- [yyyy]   Replaced by a 4-digit year of the Synoptic launch datetime
- [yy]   Replaced by a 2-digit year of the Synoptic launch datetime
- [ummmm]   Replaced by the uppercase full month name of the Synoptic launch datetime
- [ummm]   Replaced by the uppercase abbreviated month name of the Synoptic launch datetime
- [mmmm]   Replaced by the full month name of the Synoptic launch datetime
- [mmm]   Replaced by the abbreviated month name of the Synoptic launch datetime
- [mm]   Replaced by a 2-digit month of the Synoptic launch datetime
- [dd]   Replaced by a 2-digit day of the Synoptic launch datetime
- [hh]   Replaced by a 2-digit hour (24-hour clock) of the Synoptic launch datetime
- [nn]   Replaced by a 2-digit minute of the Synoptic launch datetime
- <YYGGgg>   Treated as "[dd][hh]00", substituting as shown above
- [YYYY]   Replaced by a 4-digit year of the UTC launch datetime
- [YY]   Replaced by a 2-digit year of the UTC launch datetime
- [UMMMM]   Replaced by the uppercase full month name of the UTC launch datetime
- [UMMM]   Replaced by the uppercase abbreviated month name of the UTC launch datetime
- [MMMM]   Replaced by the full month name of the UTC launch datetime
- [MMM]   Replaced by the abbreviated month name of the UTC launch datetime
- [MM]   Replaced by a 2-digit month of the UTC launch datetime
- [DD]   Replaced by a 2-digit day of the UTC launch datetime
- [HH]   Replaced by a 2-digit hour (24-hour clock) of the UTC launch datetime
- [NN]   Replaced by a 2-digit minute of the UTC launch datetime
- [0xhh]   Replaced by a single ASCII character of hexadecimal value hh
- ^p   Replaced by carriage return/line feed pair
- ^t   Replaced by tab character
- ^n   Replaced by carriage return character

- ^r   Replaced by line feed character

The BUFR messages may additionally be configured with a different routing header for the 100hPa automatic message, where this is applicable.

The "Reset All" button at the lower right of the form may be used to reset all message settings back to the installation defaults.

CHAPTER 4
SOUNDING SETUP

This is the second section to be completed.   Its tasks only become available once the System Setup section has been completed.   This section handles the data entries that are required before a sounding may be made.
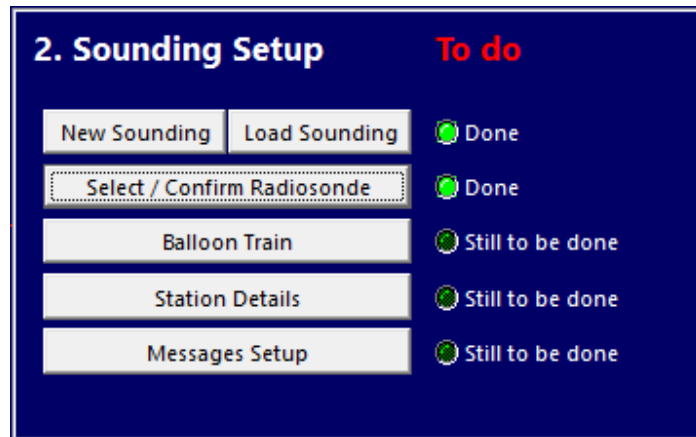
Figure 4-1: Sounding Setup

4.1 <u>NEW SOUNDING</u>

This task is selected if a new balloon ascent is to be undertaken.   The user is warned if there is a currently active balloon.   They are then prompted to give the sounding an identifier name.   This format or content of this name may be defined by the organization under which the upper-air observations are made.   An automatically generated name may also be used, if so configured, by clicking on the "Make Name" button.
  Alternatively, any suitably descriptive name should be chosen.   The name may not include '/' (forward slash), '\' (back slash), '*' (star), '?' (question mark), '<' (less than), '>' (greater than), ':' (colon), '"' (double-quote) or '|' (pipe) characters.   The user will be warned if they have selected a sounding name that already exists.

Should the predefined name format include a flight number field and/or release number field, controls to set these are displayed on the form.   Previously-used values are retained across sessions.
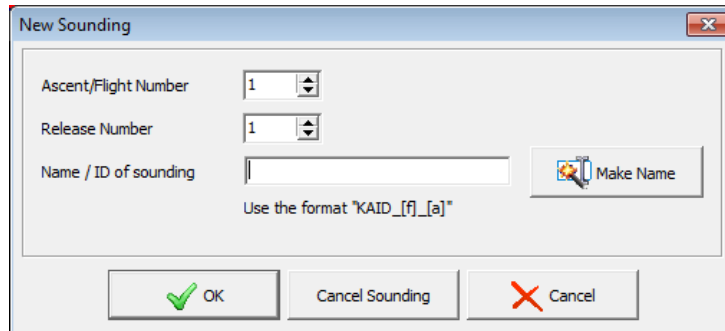
Figure 4-2: Sounding ID

(All files that are created during a sounding are stored on the hard disk in a folder with the sounding name, below the folder selected in the Operational Preferences task from section 3.6).

The name of the current sounding is displayed in the lower left of the screen.

Once a new sounding has been started, the outer border of the Sequence screen will appear in red. This is a "warning flag" that may be noticed at a glance from some distance, to indicate to the operator that the sounding has been started, but ascent has not yet been registered. See Section 5.2 below for further border colour indicators.

The "No Sounding" button is used to reset the system back to a state in which no sounding is being prepared or viewed. It is necessary to be in this state for certain system configuration opeations (e.g. hardware COM port selection and sounding data location selection).

4.2 LOAD SOUNDING

This task is selected to review a previously completed sounding. The user is warned if they are about to abort another partially completed sounding.

The Sounding selection form is displayed. This form displays all non-archived soundings (both completed and uncompleted) that have been stored by the system. Scanning for soundings may take some time, depending on the number of non-archived soundings on record. Progress is shown in the lower right corner of the screen.
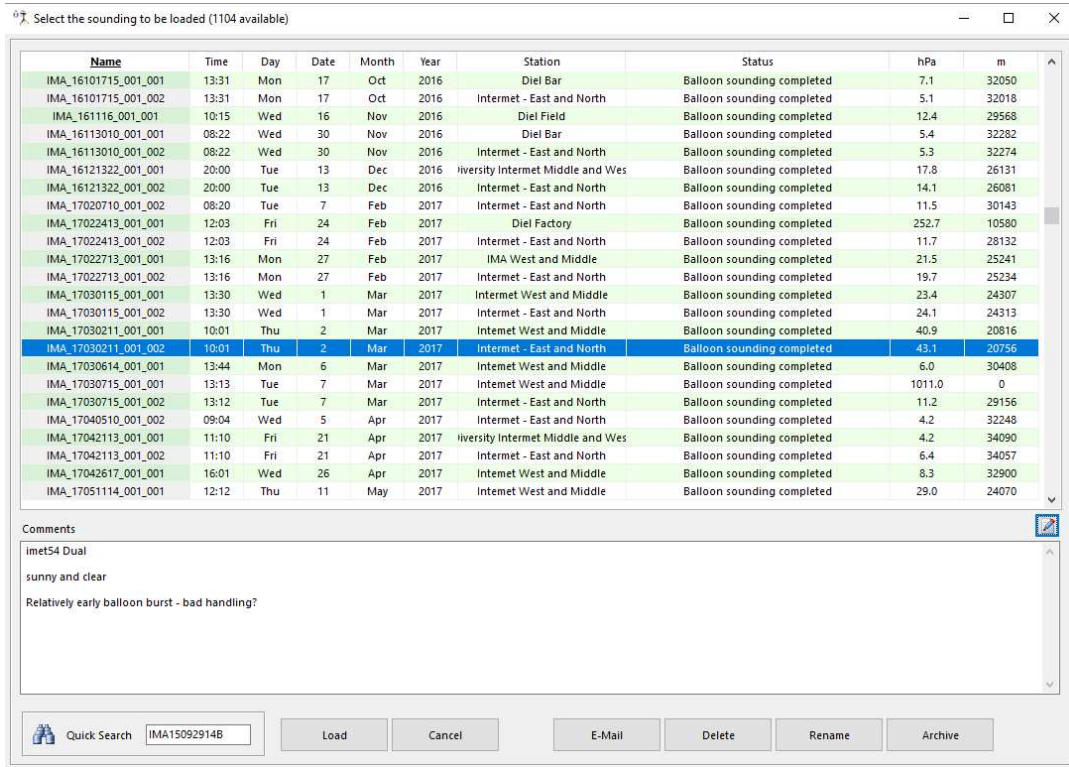
Figure 4-3: Sounding Library

Clicking on the column titles will sort the sounding list.   A quick-search entry can also aid in finding the required sounding.

Double-click on a sounding, or click Load, to load the sounding.

Other sounding management buttons are also available in this screen.   These include Email (to mail the selected sounding), Delete (to delete the selected sounding), Rename (to change the name of the selected sounding) and Archive (to move the selected sounding into an archive)

The comments that are associated with a sounding may be edited, without loading the sounding.   The edit button is located to the top right of the comments section.

4.3 SELECT / CONFIRM RADIOSONDE

This form allows the user to specify the type of radiosonde that is to be used in the sounding.   If the ground equipment that is configured for use in Antenna (Section 3.2.1 above) supports only one type of radiosonde, this form will be automatically flagged as "Done".
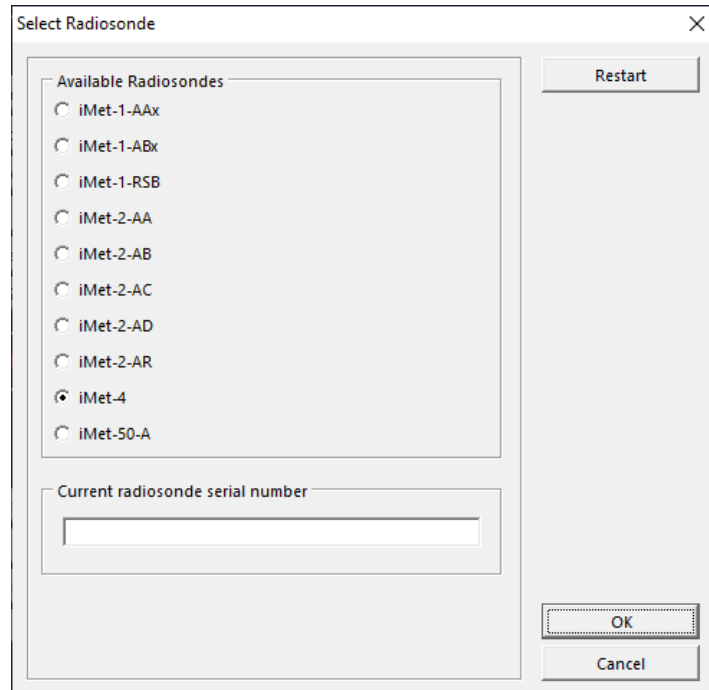
Figure 4-4: Radiosonde Selection

Most of the available radiosondes will automatically provide their serial number as part of their data transmission packet.   As soon as this has been received by the system, it will be displayed here.   Entry of the "Current radiosonde serial number" will be available (un-greyed) for those radiosondes that do not automatically provide their serial number (e.g. iMet-1-AAx, iMet-1-ABx and iMet-4) or that use data encryption (e.g. iMet-2-BB).

Only data from the radiosonde with the displayed serial number will be accepted and processed by the sounding software.   The wording "Wrong Sonde" will be displayed in the radiosonde data areas of the Status Bar (Figure 1-4) if data is received from another radiosonde.   Should it be necessary to change radiosonde, the first radiosonde should be turned off (if possible) and the replacement radiosonde activated.   The Restart button on this form should be clicked to indicate the change in radiosonde.

Pressure sensor-equipped radiosondes may, if so desired, use the pressure (and temperature and humidity) to determine altitude, rather than using the GNSS altitude.   If this is available, selection should be made in the checkbox that will be available at the bottom of this form.   By default, both the geometric and geopotential altitudes, as well as the pressure, are derived from the GNSS altitude in GNSS-equipped radiosondes.   After termination of a sounding, this selection may be changed, whereupon altitude-related data will be recalculated.
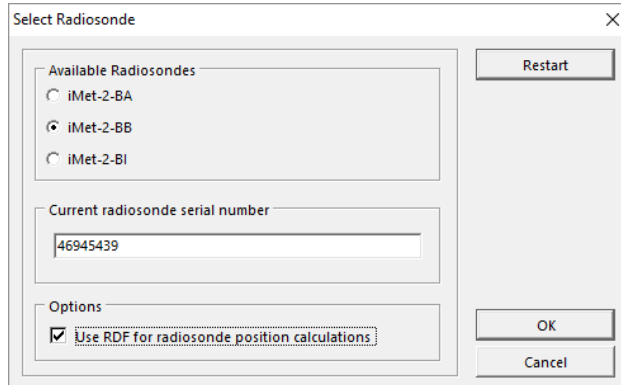
Figure 4-5 : Radiosonde position calculation option

GNSS- and pressure sensor-equipped radiosondes that are deployed in conjunction with RDF tracking antennas offer redundancy in position determination.   These radiosondes may have their position (and balloon path and winds) determined either from GNSS data (latitude, longitude and altitude) or from RDF calculations (antenna angles, pressure, temperature and humidity).   If such a radiosonde is used, a checkbox will be offered where the user may choose to ignore GNSS data and use RDF calculations.   See Figure 4-5.   The radiosonde will then be tracked, and its position determined, using radio direction finding and pressure-based altitude principles.   (The user is referred to the appropriate operator's manual for further information regarding the antenna installation and its capabilities.)   The actual tracking of GNSS-equipped radiosondes may be done using GNSS-position calculations, RDF signal tracking or even using manual antenna movements. The method chosen may be set in the Controls screen (see Section 7.1.1)
If RDF signal tracking is used continuously during a sounding, the option exists, after sounding termination to swap between position calculation via GNSS or RDF principles.   This is done by toggling the checkbox option.

If a research radiosonde (e.g. iMet-1-RSB or iMet-2-AR) is selected, the instrumentation payload and possible configuration data should be recorded.   This is done via a "Research" button that is made available when a research radiosonde is selected for the sounding.   The user will then select the instrument type/s and configuration data, where required.
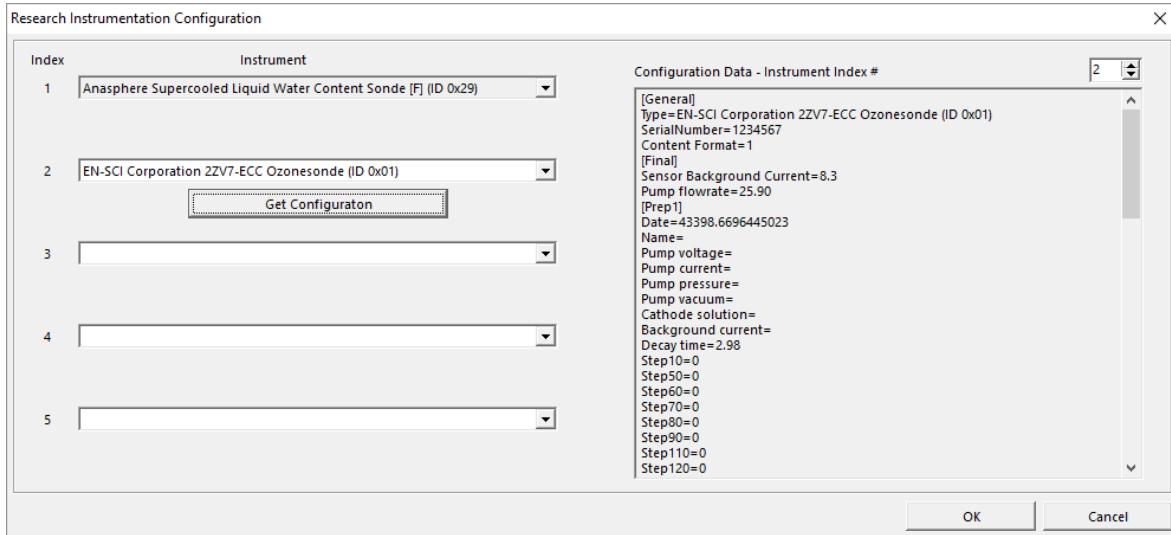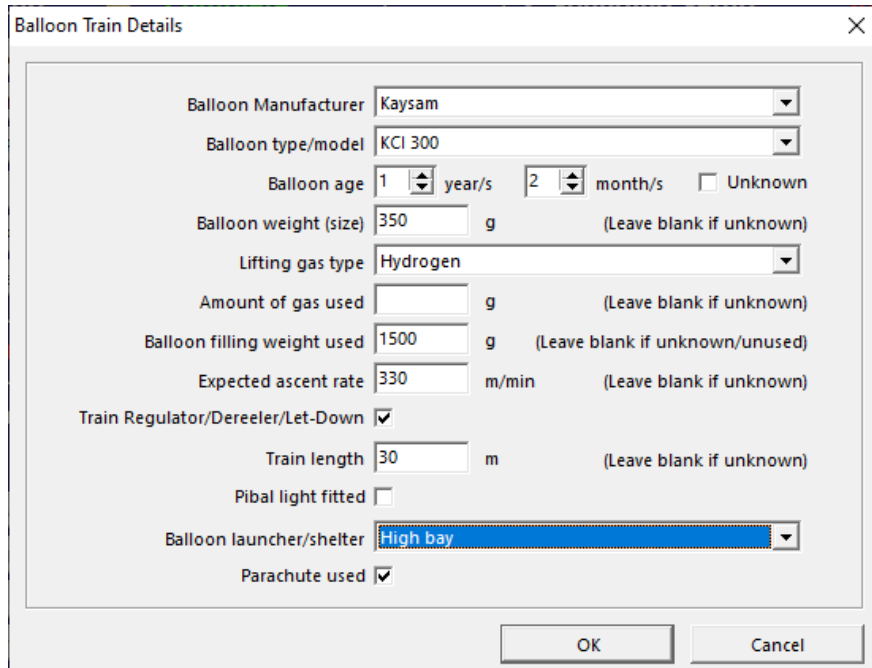
Figure 4-6: Research Instrumentation Configuration

4.4 BALLOON TRAIN

This form allows the user to record details about the balloon and balloon train that is to be launched.   The data entered here is used for logistical and performance analysis purposes.

Figure 4-7: Balloon Description

The manufacturer and balloon model should be selected from the list of BUFR-supported data. The balloon age may be specified in years and months, or indicated as unknown. Although it is desirable that all entries should be filled in, a non-numerical value for balloon weight and/or the balloon filling weight will indicate that these values are unknown.

4.5 STATION DETAILS

This form is used to fill in details about the reporting station, from which the sounding is being conducted. Many of the items that are filled in on this form appear in the standard sounding messages.

Figure 4-8: Ground Station Details

The Station Name is a descriptive name that is used to identify the location of the sounding.   This is displayed in one of the columns when loading a previously-completed sounding.

The Station Identifiers are used in various messages.   The WMO Block and Station Number and the Mobile Unit Call Sign are used in TEMP and PILOT messages.   WIGOS identifiers are used in BUFR messages. ICAO codes are used for record keeping.   The METEO11 ID appears on METEO11 messages.   These IDs may be selectively disabled in the Operational Preferences form.

The Station Location indicates details of the station position, and hence identifies the area in which the sounding data would be valid. The location details also include the altitude of the reference barometer.

If a GNSS position is automatically available from the configured ground equipment, the Get Antenna button will be enabled. Similarly, if the radiosonde is able to provide GNSS position, the Get Radiosonde button will be enabled. When enabled, either button could be used to prefill the latitude, longitude and altitude of the Station Location. These Station Location details may also be entered manually. The Clear button will erase the detailss. (Fixed stations will to obtain their location from the data that has been programmed into the antenna on installation. Mobile stations will obtain their location from the equipment GNSS, or from manual entry.)

It should be noted that the systems that currently make use of iMetOS-II do not require the station GNSS

position to be automatically available during setup or during a flight. The GNSS position is only used to assist with obtaining a valid/accurate station location.

The barometer altitude is the geometric altitude above mean sea level of the barometer from which station ground readings are taken.

The Operator Details are entered for record keeping purposes.   The name of the operator will be speed-filled from the list of users that has been entered in the Access Control section of the Utilities screen (see section 12.5).   Associated initials and ID will be looked up at the same time.   Details of operators that do not appear in the list may be filled in individually.

The Launch Site location information includes the launch altitude.   This is needed to initialize the launch point pressure for radiosondes that do not include pressure sensors.   The remaining information is required at stations that are equipped with a tracking antenna.   The information is used to orientate a tracking antenna immediately prior to launch of the balloon and, in the case of an RDF sounding, to establish a starting location for the sounding.   This is needed in order to obtain suitable wind vectors in the time immediately following a balloon launch.

4.6 MESSAGES SETUP

This form allows the operator to change some of the configuration parameters for messages that are generated.   Some of the entries that appear in this form are duplicates of entries in the more detailed Default Message Setup form (see section 3.7).   The entries in the Messages Setup override those given in the Default Message Setup.
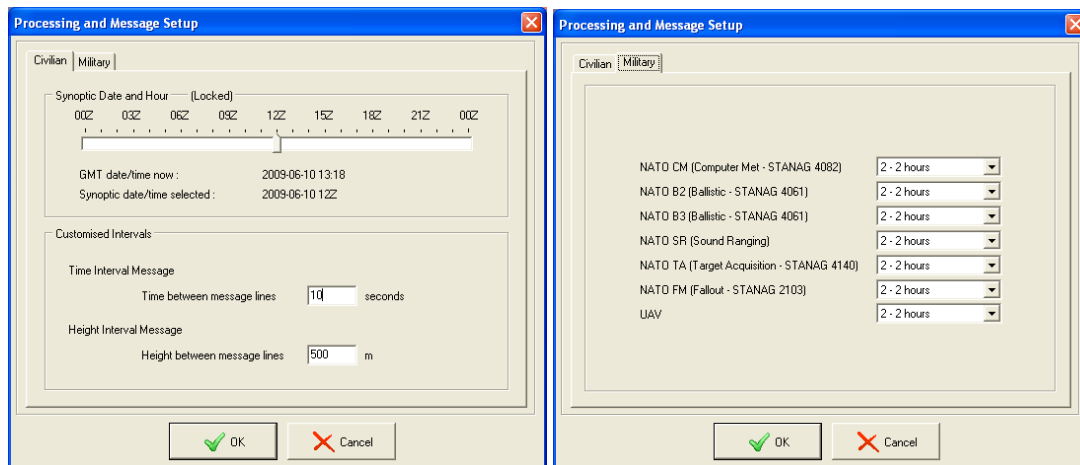
The Synoptic Date and Hour indicator shows the Synoptic ascent time to which this sounding would be allocated.   Settings in General section of the Default Message Setup form will indicate whether there should be 2, 4 or 8 synoptic sounding times per day.   If no selection has been made, the user may move the slider to the desired position.

Other parameters that may be changed are:

- Time between message lines in a Time Interval Message
- Height between message lines in a Height Interval Message
- Time validity of the various military messages.

CHAPTER 5
PRE-LAUNCH

This is the third section to be completed.   Some of its tasks are available as soon as a new sounding has been initiated.   The section handles the operations and data entries that are required immediately prior to the launching of the balloon.
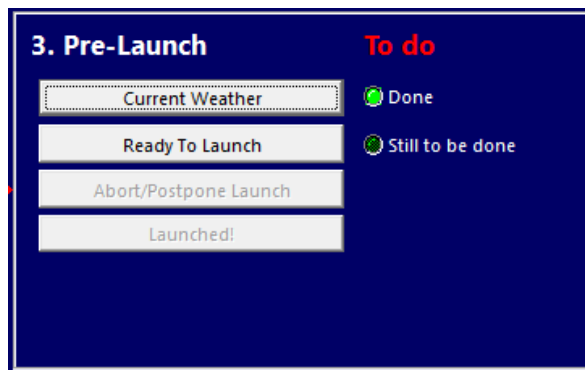
Figure 5-1: Pre Launch

5.1 <u>CURRENT WEATHER</u>

Clicking on this button will display the form for the entry of current ground and weather conditions. Pressure, Temperature (Dry Bulb), Wet Bulb Temperature or Humidity, Wind Speed and Direction are required.   Cloud and present weather details are optional.
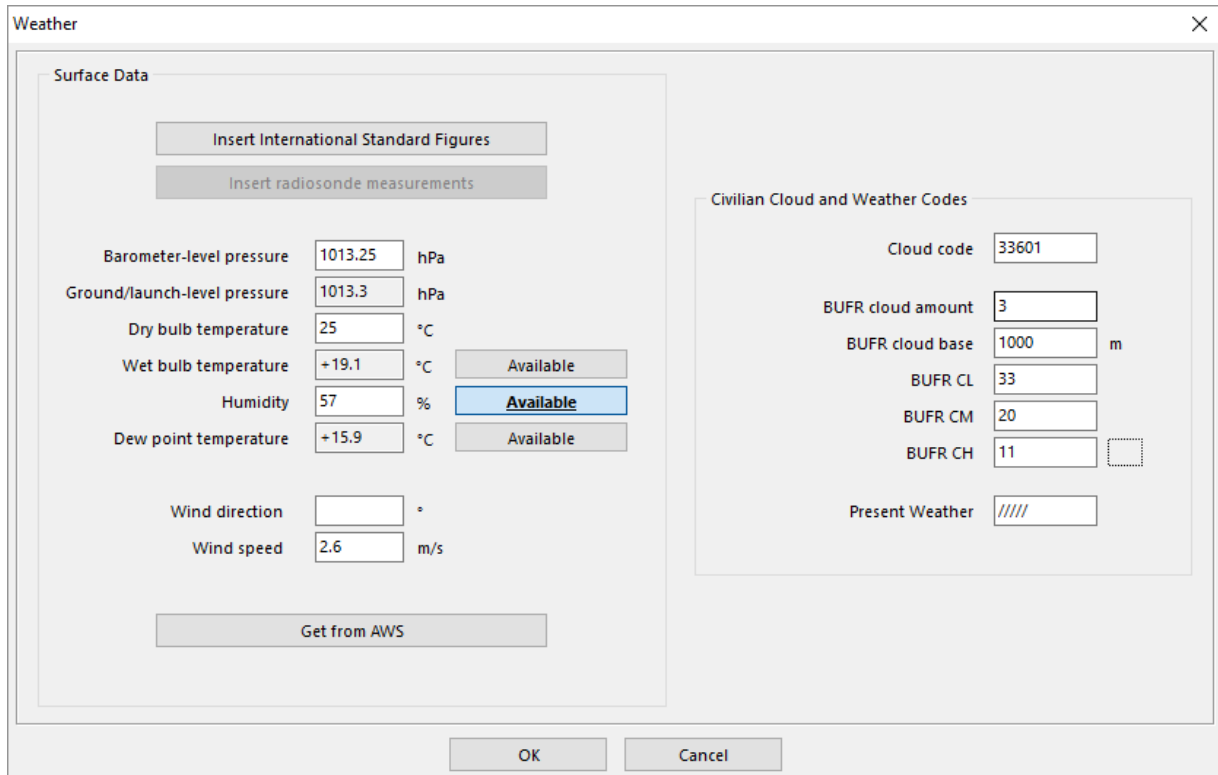
Figure 5-2: Surface Weather

Certain data may be entered automatically, using the appropriate buttons.   Buttons are provided to get data from

- an automatic weather station, if connected and configured (All available data)

- the average radiosonde readings over the past few seconds (Pressure, if available, temperature and humidity)

- International Standard Figures (Only pressure and temperature, as per the configured station altitude)

Humidity may be entered directly or via the Wet Bulb temperature.   The applicable availability button should be selected.

The 5-digit civilian cloud may be typed in directly, or may be selected from the available options by pressing the ellipsis (…) button.   This will display a detailed cloud code selection form which aids with the selection and identification of the content of the various digits in the code.

Figure 5-3: Cloud Codes

The cloud selection form contains buttons that aid with the identification of low, medium and high clouds (shown in the lower left in Figure 5-3).   These provide sample photographs of each of the listed cloud types.

Figure 5-4 : Example of photographic assistance with cloud type selection

Similarly, the various cloud codes for the BUFR report may be entered manually, if these are known, or via the associated ellipsis buttons.   The BUFR cloud amount and type selection forms are shown below.

code	Description
0	0 (0/10)
1	1 okta or less, but not zero (1/10 or less, but not zero)
2	2 oktas (2/10 - 3/10)
3	3 oktas (4/10)
4	4 oktas (5/10)
5	5 oktas (6/10)
6	6 oktas (7/10 - 8/10)
7	7 oktas or more, but not 8 oktas (9/10 or more, but not 10/10)
8	8 oktas (10/10)
9	Sky obscured by fog and/or other meteorological phenomena
10	Sky partially obscured by fog and/or other meteorological phenomena
11	Scattered
12	Broken
13	Few
14	Reserved
15	Cloud cover is indiscernible for reasons other than fog or other meteorological phenomena, or observation is not made

Figure 5-5; BUFR Cloud Codes (amount)

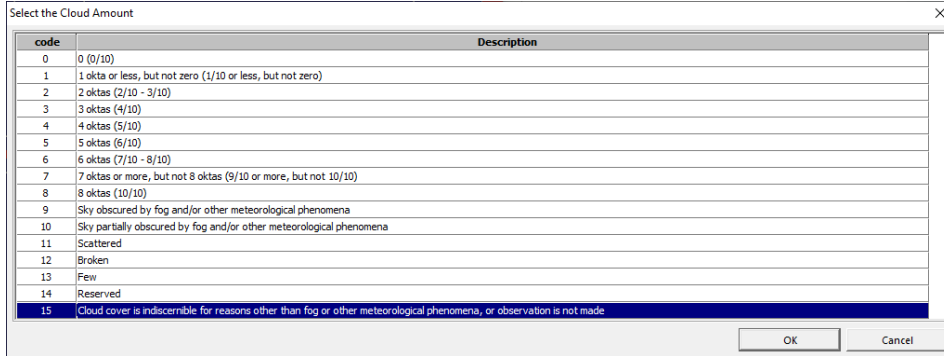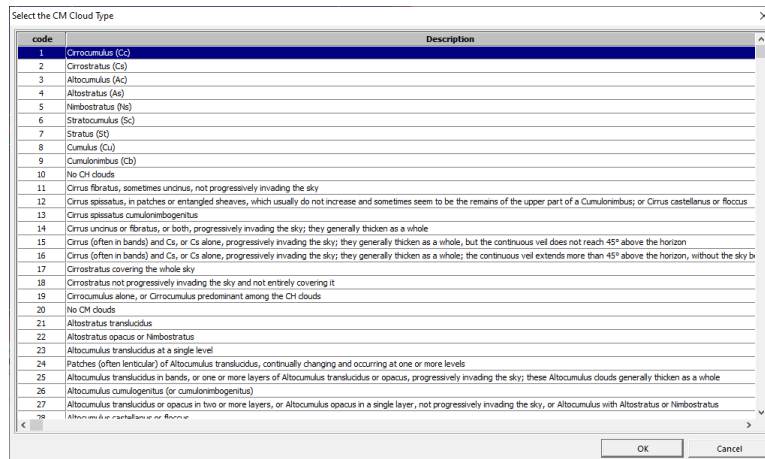| code	Description
1	Cirrocumulus (Cc)
2	Cirrostratus (Cs)
3	Altocumulus (Ac)
4	Altostratus (As)
5	Nimbostratus (Ns)
6	Stratocumulus (Sc)
7	Stratus (St)
8	Cumulus (Cu)
9	Cumulonimbus (Cb)
10	No CH clouds
11	Cirrus fibratus, sometimes uncinus, not progressively invading the sky
12	Cirrus spissatus, in patches or entangled sheaves, which usually do not increase and sometimes seem to be the remains of the upper part of a Cumulonimbus; or Cirrus castellanus or floccus
13	Cirrus spissatus cumulonimbogenitus
14	Cirrus uncinus or fibratus, or both, progressively invading the sky; they generally thicken as a whole
15	Cirrus (often in bands) and Cs, or Cs alone, progressively invading the sky; they generally thicken as a whole, but the continuous veil does not reach 45° above the horizon
16	Cirrus (often in bands) and Cs, or Cs alone, progressively invading the sky; they generally thicken as a whole; the continuous veil extends more than 45° above the horizon, without the sky be
17	Cirrostratus covering the whole sky
18	Cirrostratus not progressively invading the sky and not entirely covering it
19	Cirrocumulus alone, or Cirrocumulus predominant among the CH clouds
20	No CM clouds
21	Altostratus translucidus
22	Altostratus opacus or Nimbostratus
23	Altocumulus translucidus at a single level
24	Patches (often lenticular) of Altocumulus translucidus, continually changing and occurring at one or more levels
25	Altocumulus translucidus in bands, or one or more layers of Altocumulus translucidus or opacus, progressively invading the sky; these Altocumulus clouds generally thicken as a whole
26	Altocumulus cumulogenitus (or cumulonimbogenitus)
27	Altocumulus translucidus or opacus in two or more layers, or Altocumulus opacus in a single layer, not progressively invading the sky, or Altocumulus with Altostratus or Nimbostratus
28	Altocumulus castellanus or floccus

Figure 5-6 : BUFR Cloud Codes (type)

The NWS 9-character cloud and weather code may be selectively enabled (under Operational Preferences) to replace the above cloud selection options.

After termination of a sounding, Current Weather information may be changed, whereupon data will be recalculated and messages regenerated.

5.2 READY TO LAUNCH

Selecting this operation will cause the system to perform final tests on the ability of the system to go ahead with a sounding.   If these are passed or accepted, the system is readied to identify the launch of the balloon.

The following tests are made:

- Weather/ground conditions must have been entered recently. They should have been entered or confirmed within the time period specified in Operational Preferences. The launch may not proceed without recently entered or confirmed data.
- The ground pressure is checked to see that it is within 15hPa of the expected standard pressure for the altitude. This is a warning only, and is to minimize the chance of invalid ground pressure values being entered.
- Communications must have taken place with the connected ground equipment, and it should all be functioning correctly (i.e. built-in tests passed).
- PTU data and GNSS data, if required, should have been received from the radiosonde.
- Certain GNSS radiosondes are checked for frequency stability.
- Attention is drawn to any large difference in pressure (more than 2HPa) between that reported by the radiosonde, and that entered for the ground conditions (weather). The user is prompted to make a decision as to whether to continue or to correct the error (e.g. replace the radiosonde or re-enter data).
- If an automated ground check has not been done, attention is drawn to any large difference in temperature (more than 2°C) between that reported by the radiosonde, and that entered for the ground conditions (weather). The user is prompted to make a decision as to whether to continue or to correct the error (e.g. replace the radiosonde or re-enter data).
- If an automated ground check has not been done, Attention is drawn to any large difference in humidity (more than 10%) between that reported by the radiosonde, and that entered for the ground conditions (weather). The user is prompted to make a decision as to whether to continue or to correct the error (e.g. replace the radiosonde or re-enter data).
- Should the radiosonde supply GNSS data, attention is drawn to any large difference in altitude (more than 30m) between that reported by the radiosonde, and that entered for the station details. The user is prompted to make a decision as to whether to continue or to correct the error (e.g. replace the radiosonde or re-enter data).
- A tracking antenna, if used, should not be locked by the CDU.

5.2.1 Tracking Antenna

The tracking antenna (if used) is orientated for launch, following the passing or acceptance of the above tests. The orientation will depend on the type of radiosonde being used and the station setup selections made. For GNSS radiosondes, the antenna points to different orientations, depending on the selection made in Station Details. For local launches with low wind speeds, the antenna is moved to a high elevation as this offers good all-round data reception. For local launches with high wind speeds, the antenna is moved to point in the direction that the balloon is expected to move following release. For launches some distance from the antenna, the antenna is moved to point at the launch site, with a 0° elevation. For RDF radiosondes, the antenna points the azimuth to the bearing that was set up under Station Details, and elevation is moved to 0°.

5.2.2 Automatic Launch Detection

An ascent rate monitor is now enabled, if automatic launch detection has been enabled in Operational Preferences, and the sounding status is moved on to "awaiting launch". The outer border of the Sequence screen changes from red to green to indicate (with ease from a distant viewing location) that the system is now waiting to detect balloon ascent. Once a valid ascent is noted, some extra data samples are taken and

then the system moves on to the Sounding state (with the normal grey outer border of the screen).

5.2.3 Manual Launch Detection

A manual "Launched!" button is shown in the Pre-Launch section if automatic launch detection is not enabled (see section 3.6 Operational Preferences). This button should be clicked after it is confirmed that the balloon has left the ground. Some extra data samples are taken and then the system moves on to the Sounding state (provided that the system detects an ascent rate of more than 0.3 m/s).

5.2.4 Abort/Postpone Launch

This button becomes available after the "Ready To Launch" button has been clicked. It may be used to abort or postpone a launch should something cause a delay or cancellation of the launch. The system then returns to the state that it was in immediately prior to the clicking of the "Ready To Launch" button.

CHAPTER 6
SOUNDING

6.1 GENERAL

This is the fourth and final section to be completed.   Tasks here relate to the actual ascent of the balloon, or to the sounding as a whole.
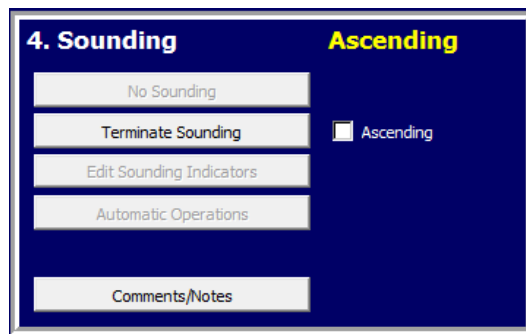

Figure 6-1: Sounding Controls Screen

6.1.1 No Sounding

This operation is available during the Sounding Setup and Pre-Launch stages, provided that the Station Details have been filled in and the Ready To Launch operation has not yet been started.

The operator is given a range of options used to indicate the reason why no sounding might take place. Once selected, the sounding is considered terminated (or aborted).   Depending on the setting for automatic operations in Operational Preferences, automatic operations may be launched immediately following confirmation of a No Sounding situation.
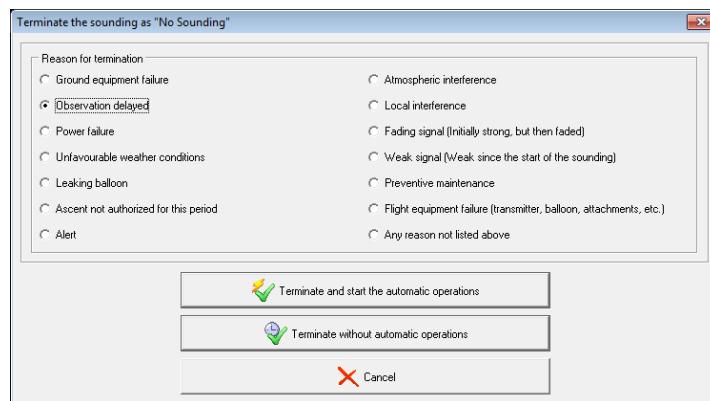

Figure 6-2 : No Sounding

6.1.2 Terminate Sounding

This operation is available once the launch has been confirmed and processing of the sounding data is taking place.   Manual termination of the flight by clicking on this button remains available during the ascent but is disabled should any automatic termination conditions (as defined under Operational Preferences) be met.
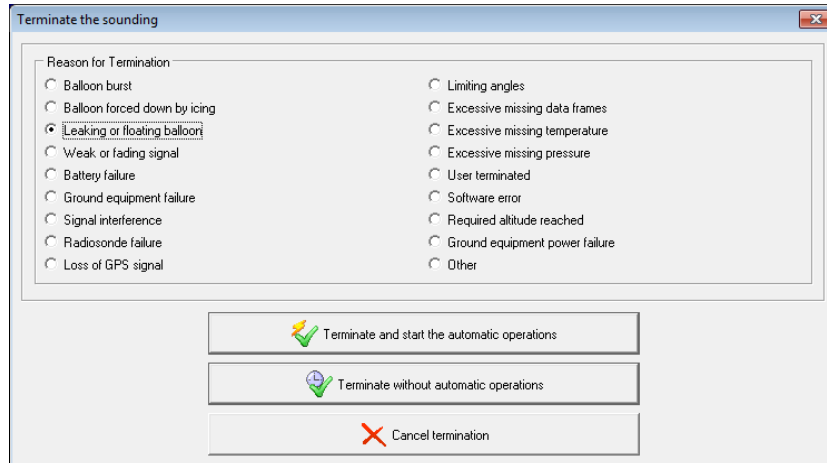

Figure 6-3 : Manual sounding termination

The operator is prompted to select the reason for the termination.   As with the No Sounding operation, above, automatic operations may be configured to immediately follow termination.   Alternatively, as shown in Figure 6-3, above, the operator may have the option to terminate without immediately starting these operations.

6.1.3 Edit Sounding Indicators

This operation is only made available after the termination of a sounding.   The sounding indicators available for editing depending on whether the sounding was aborted (No Sounding) or terminated (manually or automatically),.

If the sounding was aborted (No Sounding), the operator may edit the previously stated reason for the No Sounding condition.

If the sounding was terminated some time during the balloon flight, the operator may edit the reason for termination as well as optionally specify reasons why a report is incomplete (Region 4 101$A_{df}A_{df}$ codes)

In either case, the operator may make indicators as to the System Status.   These indications may, for example, be used in Section 7 of TEMP messages.

6.1.4 Automatic Operations

This button is available if automatic operations are selected to not take place immediately after a sounding abortion or termination.   Automatic operations include

- Generation of all messages, using the currently available data records

- Launching of all automatic commands (3.2.7 Automatic Commands)
- Sending of configured messages (3.2.6 Automatic Messages) by FTP, email or the selected distribution method (3.2.5 Distribution Channels)

6.1.5 Comments

"Free range" textual comments may be added to the sounding at any time after the initiation of the sounding. There is no limit to the amount of comments that may be made.

CHAPTER 7
GROUND SYSTEM CONTROLS

This screen is used to directly control the ground equipment that is connected to the workstation computer. This will include a tracking antenna and/or receiver, depending on the type of radiosonde selected for the sounding, and optionally the radiosonde when connected to a ground check unit.

7.1 ANTENNA/RECEIVER CONTROL

Control of the antenna and/or receiver is selected by clicking on the "Antenna/Receiver" button. Indicators and control buttons are displayed. Control is carried out by clicking on buttons to obtain the desired results. At all times, only the operations that are available to the user are enabled.
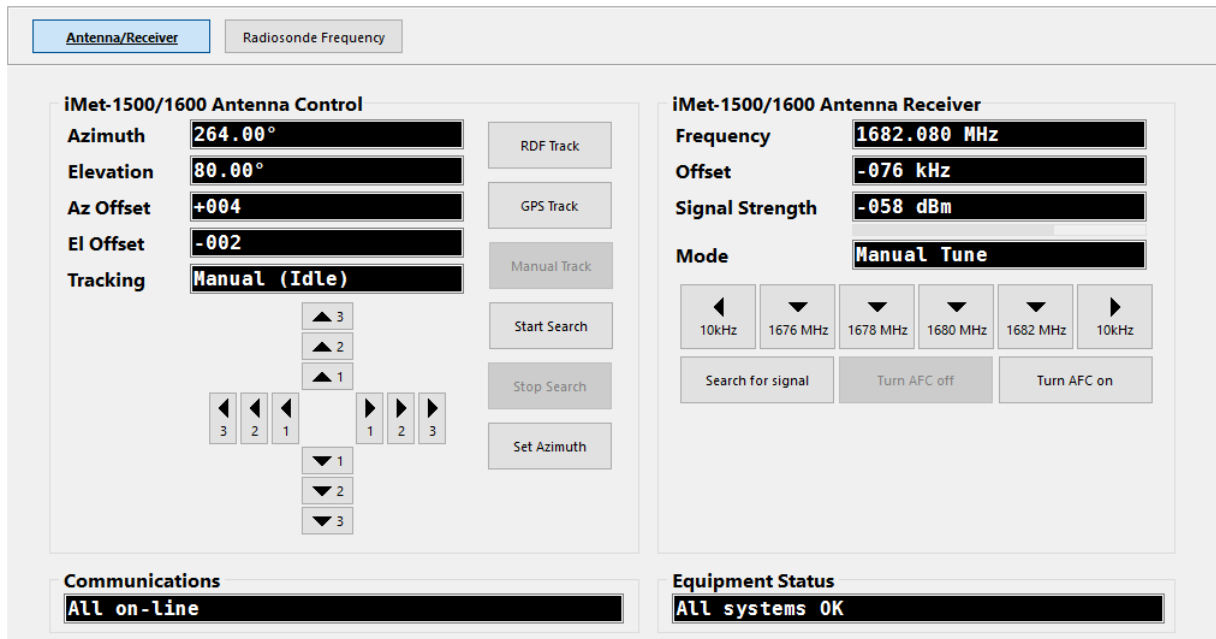
7.1.1 Tracking Antenna Control

Figure 7-1: Tracking Antenna and Receiver Controls

The left panel in Figure 7-1 above, is only displayed when a tracking antenna is installed. It is used to control and monitor the movement and orientation of the tracking antenna.

Under normal tracking antenna operating conditions, it will not be necessary to make use of these controls. The software will orientate the antenna to the required balloon launch position at the start of the sounding.

In RDF soundings, the user will, at launch, normally enable automated tracking from the antenna's CDU. Thereafter the antenna will keep itself automatically aligned to the radiosonde signal. If, for some reason, alignment is lost, it may be reclaimed using the slew antenna control buttons or search button on this

screen, or via the CDU. (In RDF soundings, the antenna angles are also displayed, on all screens, in the status bar at the bottom of the screen.)

In GNSS soundings, the software will ensure that the antenna is kept pointing at the last-known radiosonde location. If, for some reason, alignment is lost, it may be reclaimed using the antenna control keys on this screen, or via the CDU.

The "Auto Track" button will start automated signal tracking of the radiosonde. In this mode the antenna continually monitors the signals received from the radiosonde, and adjusts the azimuth and elevation motors to align the radiosonde onto the boresight of the antenna. The type of tracking is usually used in RDF operations, but it may also be employed when tracking a GNSS radiosonde. The antenna should be aligned within a few degrees of the radiosonde location before "Auto Track" is enabled. The button is disabled when tracking is active.

The "GNSS Track" button is available only if a GNSS-enabled radiosonde is being used. GNSS tracking causes the antenna to regularly re-align onto the last-received latitude/longitude/altitude location of the radiosonde. This button is disabled when tracking is active.

The "Manual Track" button is available whenever tracking is active. Clicking this button will cause automatic tracking of the radiosonde to be suspended. The antenna may then be slewed using the direction control buttons. It should be noted that switching to manual control during a properly tracking sounding may result in a loss of radiosonde signal as the antenna will no longer be following the radiosonde location.

The "Start Search" button is available whenever automated tracking is disabled. Clicking this button will move the antenna to align with the last known radiosonde position, and begin a search pattern to locate the radiosonde signal. An active search may be immediately halted by clicking on the "Stop Search" button.

The "Set Azimuth" button is available whenever automated tracking is disabled. Clicking this button will permit the user to set the current azimuth angle of the antenna. This is a duplication of the north-referencing function that would normally be carried out using the CDU.
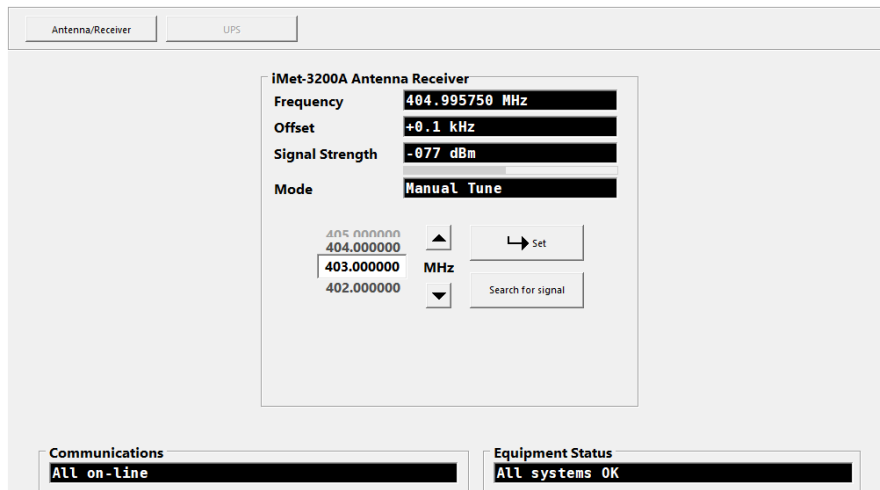
7.1.2 Receiver Control

Figure 7-2 : Receiver Controls

The right panel in Figure 7-1 above (for tracking antennas), or the controls shown in Figure 7-2 (for receivers only), are used to control and monitor the status of the receiver.   Certain installations operate with dual receivers (e.g. ship-borne systems).   In that case, two receiver control panels, as shown in Figure 7-2, will be displayed side-by-side.

Under normal operating conditions, it will not be necessary to control the receiver(s) from this screen. After selection of a radiosonde, the receiver(s) is instructed to perform regular frequency sweeps to find and lock onto the strongest signal (that would be coming from an active radiosonde).   Should the search not yield a radiosonde, or should the receiver(s) lock onto a non-radiosonde transmission, it will be necessary for the user to make use of this screen to manually tune the receiver(s).

In dual-receiver installations, the software will automatically extract valid radiosonde data, if available, and report on receiver status from the receiver with the stronger signal strength.   Manual override of this selection is available via a "Manual Select" button in each receiver panel.

7.2 UPS CONTROL

If configured, the output of a connected UPS may be turned on and off under the control screen that is accessed via the "UPS" button. Note that the current status of the UPS output is not available, but may be inferred from the Communications and/or Equipment Status indicators.
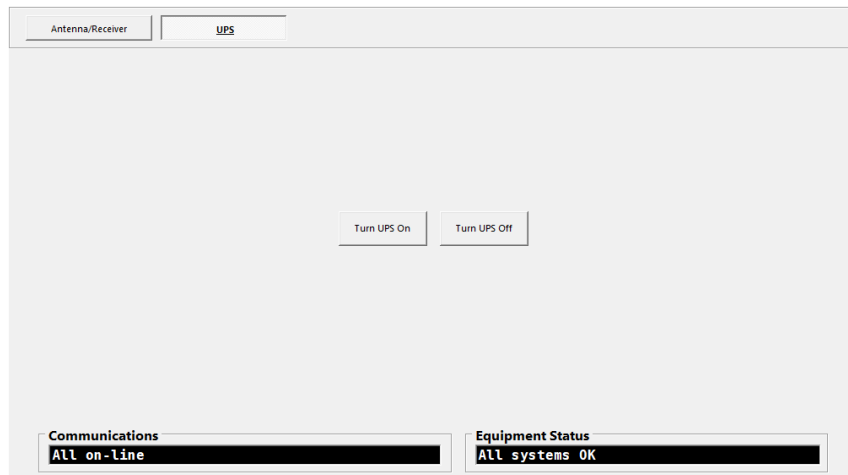

Figure 7-3: UPS output control

CHAPTER 8
DATA

This screen displays processed data from the radiosonde (i.e. data that may have been filtered, smoothed and extrapolated) during a balloon ascent as well as optional GNSS data (depending on the ground equipment and radiosonde type).   This form is only made available after the selection of a radiosonde type, but is disabled once the sounding has terminated.

8.1 PROCESSED DATA

Initially, until the launch has been confirmed, the screen shows only an indication of the time and an ascent rate figure.

Once the balloon launch has been confirmed, and data is being received for processing, the data fields will be filled with processed data.

The "Real Time Now" figure may be swapped between local and GMT time by double-clicking on it.

Hovering the mouse over the Wind Speed and Ascent Rate figures will cause a hint to pop-up, displaying the figure in other common units of measurement.

Figure 8-1: Radiosonde Data Screen

8.2 RADIOSONDE GNSS

If an iMet-2 radiosonde is in use, GNSS satellite data, as seen by the radiosonde, may also be displayed. Similarly, certain ground equipment provides the GNSS satellite constellation for the station location GNSS which may be viewed from this form.
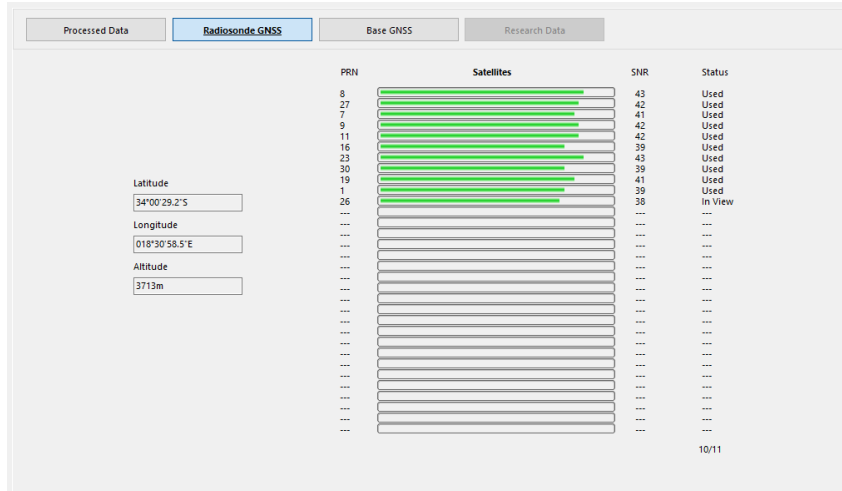
Figure 8-2: GNSS Satellite Reception (Optional)

8.3 BASE GNSS

A screen, like that shown below, is available if the ground station uses GNSS.
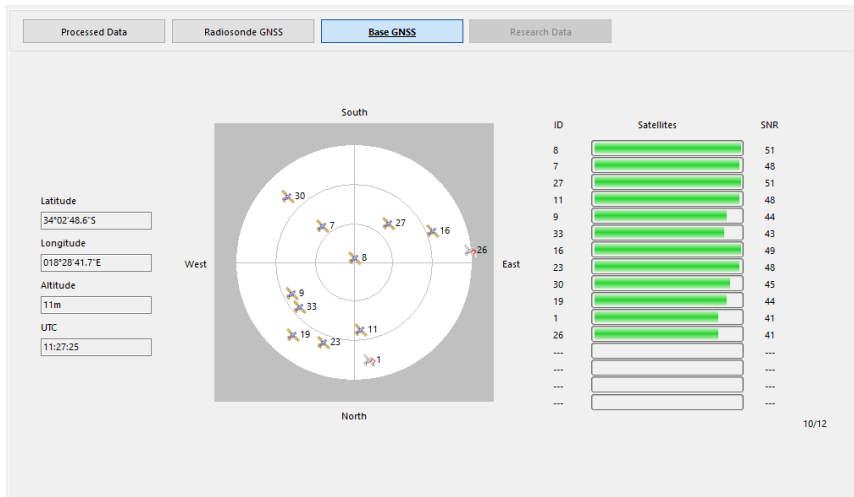
Figure 8-3: GNSS Satellite Reception (Optional)

8.4 <u>RESEARCH DATA</u>

A screen dedicated to research data packets and interpretation is available under this data section when a research radiosonde has been selected.

See Appendix C : for handling of specific research radiosondes.

8.5 <u>GROUND WEATHER</u>

A screen, like that shown below, is available if the Ground Weather equipment has been enabled (see Section 3.2.3) and installed.
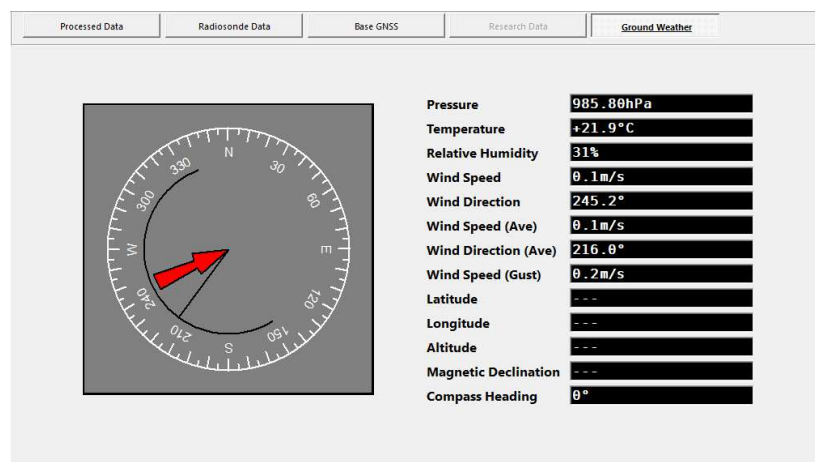
Figure 8-4 : Ground Weather Data (Optional)

CHAPTER 9
GRAPHS

Most of the graphs shown on this screen are available only after a balloon launch has been detected. These graphs present the processed data in various forms during a balloon ascent.
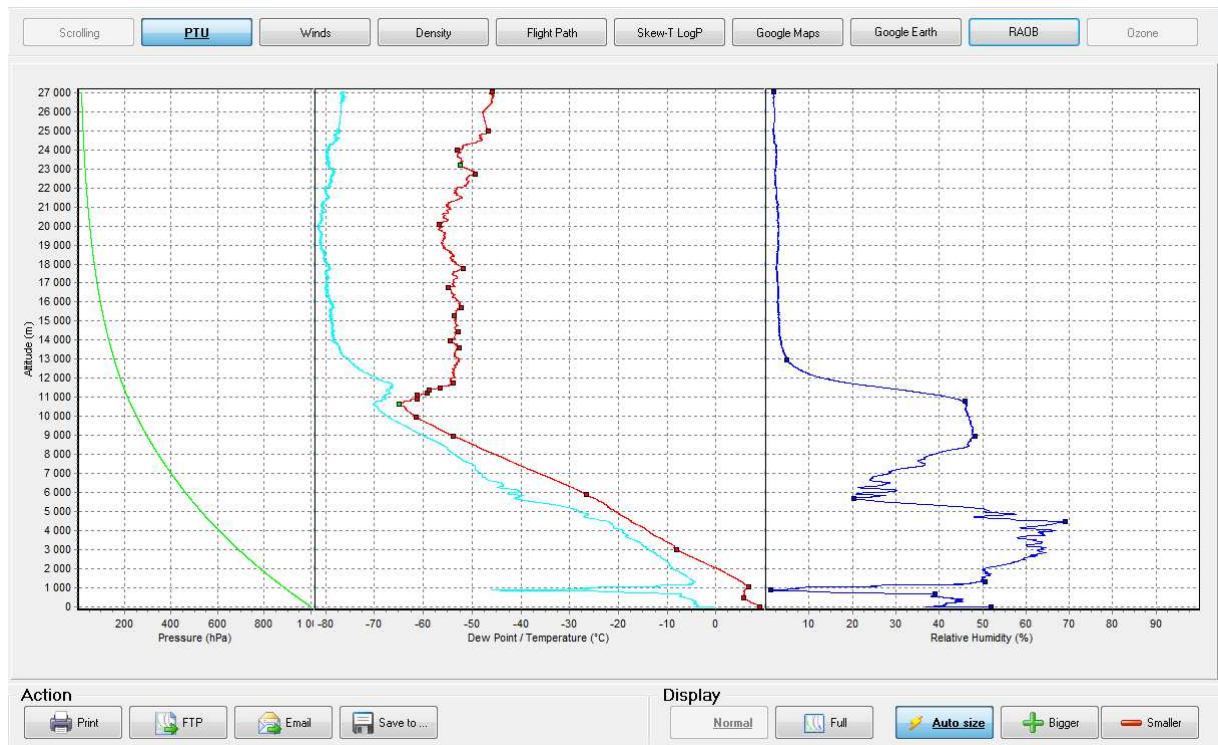
Figure 9-1: Graphs

PTU (including Dew Point), wind speed/direction, air density, flight path and SkewT-LogP graphs are available.   A Google Map showing the balloon flight path may be obtained, if the system has internet access.   Similarly, if Google Earth and internet connection are available, a 3D plot of the balloon path may be viewed.   Data may also be exported to the third-party graphing software, RAOB.

Displayed graphs may be printed, emailed, sent via FTP and saved as BMP files to user-specified locations.

Sections of the graphs may be examined more closely by clicking and dragging a selection box in the graph area, from the top left corner to the bottom right corner of the area of interest.   The graph may be restored to its full size by clicking and dragging a box (of any size) from the bottom right to top left corner.

The graphs are adjusted to fit the range of the variables, unless fixed scale graphs have been set up in the Display Preferences option of section 3.3.   The size of the data points on the graph is automatically

adjusted to improve resolution and readability. The automatic sizing may be overridden by clicking on the "Bigger" or "Smaller" buttons.

To observe the plots in more detail, the graph screen may be selected to fill more of the screen space. This is done using the "Normal" and "Full" buttons.

An internet connection is required for operation of Google Maps and Google Earth.

9.1 <u>THIRD-PARTY GRAPHING / GRAPHICS SOFTWARE</u>

9.1.1 <u>RAOB</u>

RAOB is the Rawinsonde Observation Program, available from Environmental Research Services. It provides facilities to plot a large range of meteorological charts including Skew T/Log P, Emagram, Tephigram and Hodograph. It also allows in-depth analysis of sounding data through many indices and graphing functions.

iMetOS-II automatically exports and launches RAOB, if it is installed, when the "RAOB" button in the Graphs screen is selected. A few once-off configuration steps are required in the RAOB software to ensure correct operations. The first time that RAOB is selected from within iMetOS-II, the graph will not display correctly. To configure RAOB

- In RAOB, select the File | Open Sounding menu item.
- Browse to the folder that is indicated as the sounding data location (as selected in the iMetOS-II Sequence | System Setup | Operational Preferences form). By default this is "InterMet\iMetOS-II\Data" folder that is found under Public Documents.
- Open the "RAOBDATA.CSV" file that will be found in this folder.
- In RAOB, select the File | Auto-Load This Sounding menu item.

Since RAOB has many settings and options, it is possible that a user might inadvertently disable the auto-load operation, as configured above. Should RAOB not show the correct flight name in its title bar when launched from iMetOS-II, repeat the above steps to reconfigure RAOB.

Note that the RAOB graphs at static, reflecting the available iMetOS-II data at the time of the graphing request. Reselect "RAOB" from the iMetOS-II Graphs screen to update the RAOB display during an active sounding.

9.1.2 <u>Google Earth</u>

Google Earth is on-line mapping software from Google. It may be downloaded free from

> http://www.google.com/earth/

iMetOS-II automatically launches Google Earth to display the balloon flight path when the "Google Earth" button is selected in the Graphs screen. No configuration is required for this operation, although a suitable internet connection is needed.

CHAPTER 10
MESSAGES

This screen displays various messages that summarize the data obtained during the balloon sounding. This form is only available after a balloon launch has been detected and data processing has commenced.
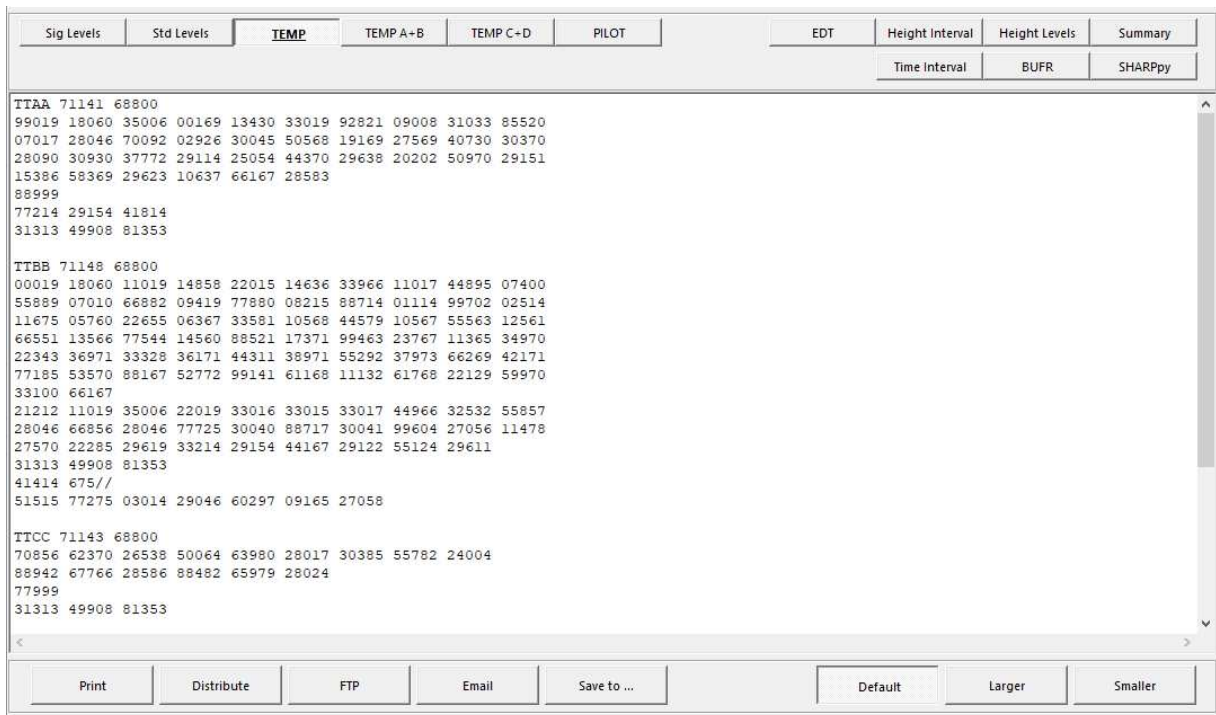
Figure 10-1: Standard Messages

Depending on the installed software options, Significant Levels, Standard Levels, TEMP, PILOT, DigiCora II, Spot Height, Standard Height, Spot Time, SHARPpy, Summary, various BUFR and various military met messages are available.

Displayed messages may be printed, distributed by UDM, TCP/IP or COM port (as configured in Section 3.2.5 above), distributed by FTP or email or saved as text files to user-specified locations.

For ease of viewing, the font size may be altered using the "Larger" or "Smaller" buttons.

Selection of a message, or opening the Messages screen, will cause regeneration of the applicable message, based on the available sounding data. As a background operation, this message is also saved to disc in the sounding folder. The message file is named as per the settings made in the appropriate form in 3.7 Default Message Setup above. It is possible to prevent the regeneration of messages by setting the read-only attribute of the appropriate file, using the Windows File Property editor. In this case, iMetOS-II will load and display the existing message file, rather than regenerate the message.

CHAPTER 11
EDIT DATA

The Edit Data screen allows the user to carry out some post-sounding re-working of the data.   This screen is only made available on completion of the sounding.

Two main editing types are presented : overall adjustments and raw data editing.

Currently, the overall adjustments are limited to a user-specification of the maximum ascent altitude. Filling in the desired altitude, and clicking on the Apply Limit button will cause all of the reports to be regenerated, with their maximum altitude limited to the given geopotential altitude.
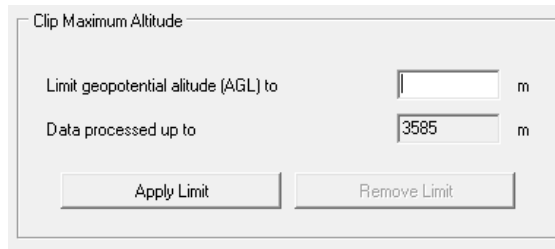
Figure 11-1 : Altitude limitation

Raw data editing may be carried out on the second-by-second temperature and humidity values that are used in creation of the met messages.   These are presented against flight time, in seconds and altitude, in geopotential metres.

Figure 11-2 : Raw data editing

Data in the temperature and humidity columns may be changed (and will be displayed in red).   Click on the "Apply edits" button to apply the changes and recreate all the messages.   Edited values will then be shown in blue.

All edits may be removed using the "Remove all edits" button.   Similarly, a range selection (spanning a single column only) may be restored to the original values using the "Remove highlighted edits" button. In both cases, all messages are recreated.

CHAPTER 12
UTILITIES

12.1 GENERAL

The Utilities screen contains a number of useful operations associated with the balloon soundings.   It is the intention to expand the number of utility operations available in future versions of the software.

The Utilities screen is available at all times.

12.2 CALCULATIONS

This utility allows the user to determine bearing, elevation, ground and slant range distances between two given points.   The points are specified by latitude, longitude and altitude.   Buttons are available to fill in the station location and latest sonde location as either of the two points.   The locations used in the calculation are stored between sessions.

12.3 SOUNDING MANAGEMENT

This utility helps with the management of sounding data.   The soundings are stored in the folder that is specified under the Operational Preferences section.   The software shields the user from having to deal with files and folders by managing these automatically.   From time to time, it is necessary to delete, rename, archive or distribute this data.   Again, this is done from within the software in a manner that does not necessitate navigation through drives and folders.

Note that the FTP functions will only be made available in a future version of the software.
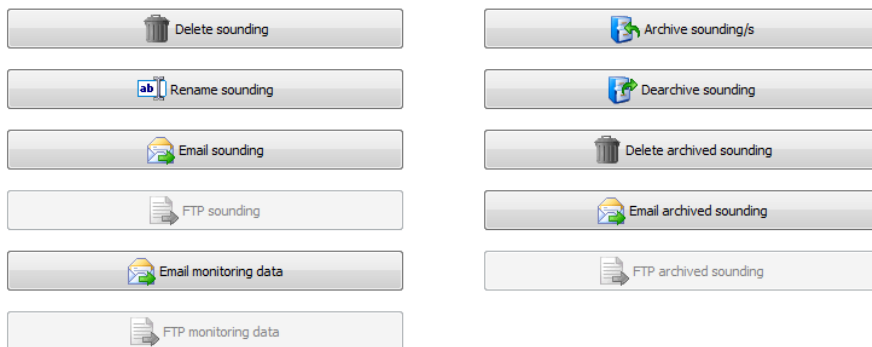

Figure 12-1: Utilities

12.3.1 Delete Sounding

Clicking the "Delete sounding" button will display a list of soundings that are available. The user may then select a single or multiple soundings to be deleted. The currently active sounding may only be deleted if it is not active. This means that deletion may not take place on the active flight if the radiosonde is busy with calibration, waiting for a launch, ascending or if the sounding is suspended.

A warning of the complete deletion precedes the operation, and the user is informed of the successful completion of the deletion. Note that a sounding will not be deleted if some other program, e.g. Windows Explorer, is accessing a file or the folder that contains the sounding data.

12.3.2 Rename Sounding

Clicking the "Rename sounding" button will display a list of soundings that are available. The user may then select a single sounding to be renamed. The currently active sounding may not be renamed.

A check is made for illegal characters in the sounding name. The characters '/' (forward slash), '\' (back slash), '*' (star), '?' (question mark), '<' (less than), '>' (greater than), ':' (colon), '"' (double-quote) and '|' (pipe) are not allowed in sounding names.

The sounding name should also not exist in the current set of accessible soundings.

The user is informed of the successful completion of the renaming. Note that the sounding will not be renamed if some other program, e.g. Windows Explorer, is accessing a file or the folder that contains the sounding data.

12.3.3 Email Sounding

All of the data pertaining to a sounding is compressed and attached to an email message. Depending on the duration of the sounding (and the speed of the PC), compression may take some time. The emailing form allows the user to fill in the To-address, CC addresses and body of the email. The subject is automatically created, but may be edited.

Email operations must have been correctly configured under 3.2 in the Communications section above.

12.3.4 Email Monitoring Data

The sounding data that is used by the manufacturer and others for monitoring of the performance of each sounding is attached to an email message. The emailing form is pre-filled with the configured To-address, subject and email body. In general no other changes are required, and the email may be sent.

Email operations must have been correctly configured under 3.2 in the Communications section above.

12.3.5 Archive Sounding

If ready access to a sounding is no longer required (i.e. it is felt that its inclusion in the list of loadable soundings is unnecessary) it may be packed away to an archive. Archived soundings also occupy less disc space than accessible soundings.

Clicking the "Add sounding to archive" button will display a list of soundings that are available. The user may then select a single sounding to be archived. The currently active sounding may not be archived.

After archiving of the sounding, it is deleted from the list of accessible soundings. Note that deletion will not be completed if some other program, e.g. Windows Explorer, is accessing a file or the folder of the sounding.

The user is informed of the successful completion of the archiving.

Archiving may not be carried out while a sounding is active (ascending).

12.3.6 De-archive Sounding

This operation performs the reverse of the above operation. It lists the soundings that have been stored in the archive. A selected sounding may then be de-archived so that it can be loaded, viewed and examined. Various checks ensure that this operation does not damage or overwrite existing data.

Archived soundings may also be deleted or emailed when viewing the archive list.

De-archiving may not be carried out while a sounding is active (ascending).
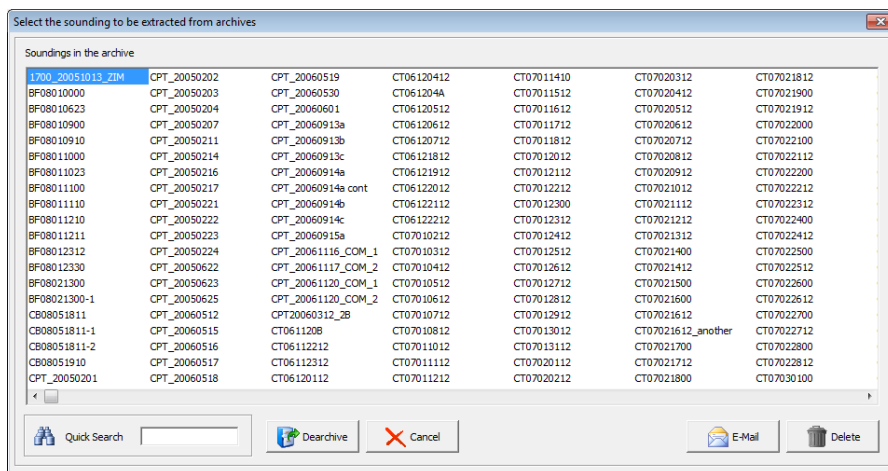
Figure 12-2 : De-archive Sounding

12.3.7 Delete Archived Sounding

This operation lists the soundings that have been stored in the archive, and permits deletion of a selected sounding.

12.3.8 Email Archived Sounding

This operation lists the soundings that have been stored in the archive, and permits emailing of the archived data for a selected sounding.

12.4 CALENDARS

The calendar utility displays three month calendars (the "current date" and the month ahead and behind) as well as a full year planner. The "current date" is initially set to the date given by the PC clock, but can be

changed by clicking on other dates, or using the navigation buttons on the central calendar.

Changing the displayed "current date" does not affect the PC clock or any information in the soundings.

12.4.1 Sun and Moon

The Sun and Moon utility displays the sunrise, sunset, moonrise and moonset times, in local time or GMT, for a given user-selected date. The date and times of the next 4 significant moon phases (full, last quarter, new and first quarter) are also shown.

12.4.2 Met Day

The Met Day utility divides the current day up into 8 meteorologically homogenous time portions. The definition of these divisions is based on studies that have identified periods of relative stability and periods of more rapid change. At present, the periods are defined for the region covered by South Africa. (Future modifications may make the period definitions user-definable.)

The period definitions, based on the current day's sunrise and sunset times, are displayed in a table. Times are shown in local or GMT.

In military applications, it may be necessary to plan ascents that will provide met data for each of the periods. To aid in scheduling, the ascent times together with the maximum periods of validity of the messages that would be generated, are included in the table. Ascent warnings may be activated. See section 3.5 Alarms, Warnings, and Sounds.

12.5 ACCESS CONTROL

The Access Control utility is used to maintain control over access to configuration items. In general, in a multi-user environment, unauthorized users should not be permitted to modify the settings that have been made under the System Setup section of the software. These settings can be locked unless the user logs in with a username and password that grants some access rights.

There are two rights that may be granted to users:

- System Setup – after login, the user may carry out System Setup configuration
- User Control– after login, the user may add or edit other user information.

The Access Control utility permits a user to log in with their user name and password.
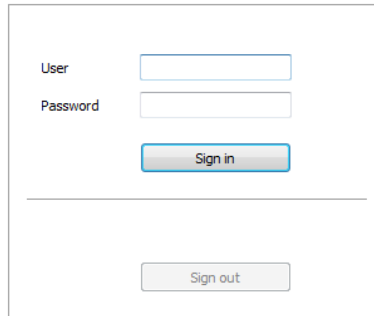
Figure 12-3 : Access Control sign-in form

A user named "Administrator", who has all of the above rights, always exists.   Following first-time installation, the user is automatically signed in as the "Administrator".   Initially, the "Administrator" user has no password.

Should the "Administrator" user be edited so as to have a password, or should additional users be added, the "Administrator" will not be signed in immediately on executing the program.   In a multi-user environment, it is recommended that the "Administrator" user be edited and assigned a password as soon after installation as possible.
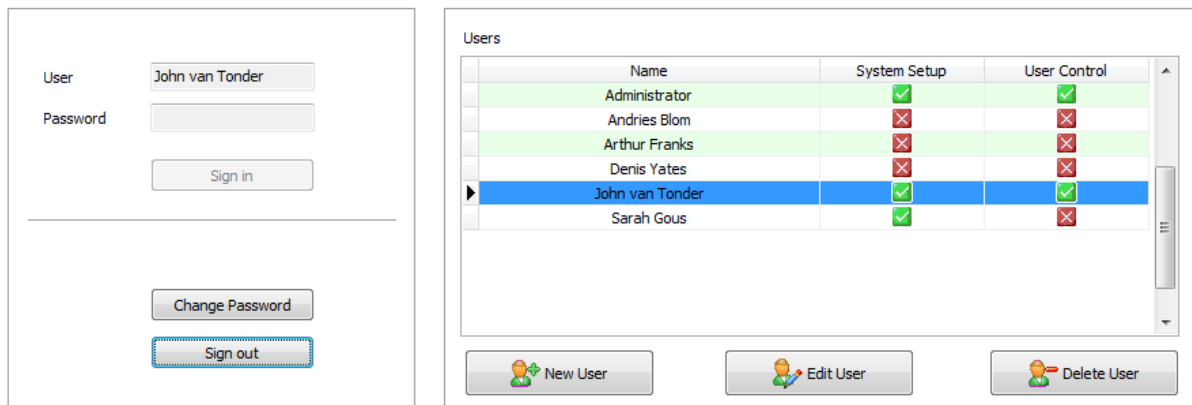
Figure 12-4: User Access Configuration

Signing in will also provide the user with the option of changing their own password.

In some installations there may be no requirement for access control.   All users would be allowed to modify the options under System Setup.   If this is the required setup, then there are two options as to how to ensure these rights without needing to sign in each time that the program is run.

1.   Do not add any additional users and do not set an Administrator password.

2.   Log in as the "Administrator" (or any other user with the System Setup rights) and select the checkbox option to "Keep signed in".
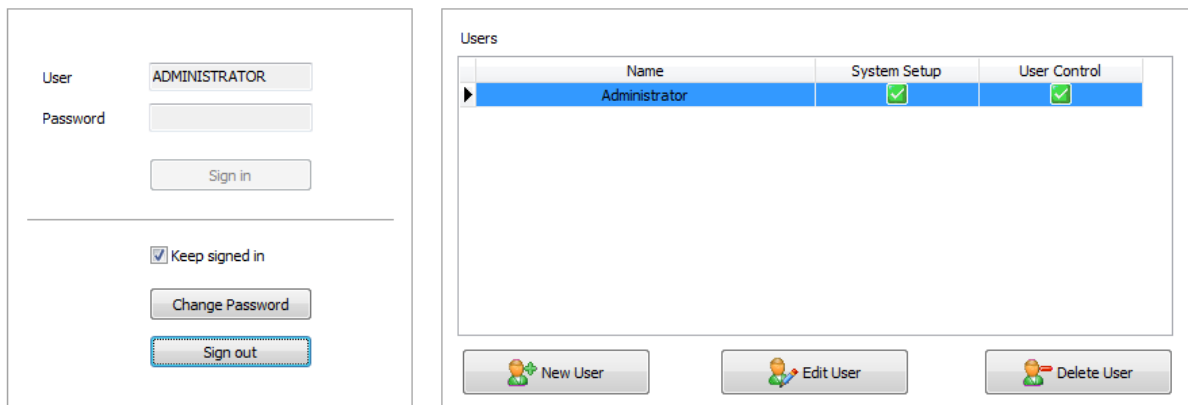
Figure 12-5 : Bypass User Sign-In

12.6 UPS CONTROL

If configured in Section 3.2.2, UPS Control will be available, as shown in the Utilities > UPS tab (Figure 12-6).
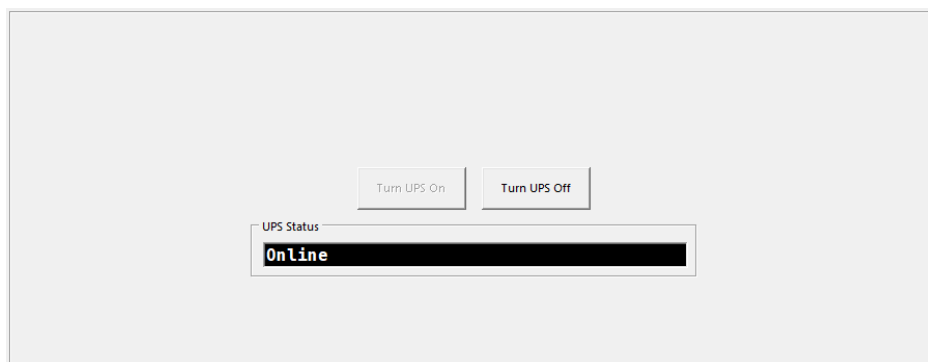
Figure 12-6 UPS Controls

Continual polling of the UPS is used to indicate the Online/Offline status, and the availability of the control buttons indicates the current status of the UPS.

CHAPTER 13
HELP

The Help screen displays the software version information and permits access to PDF files that detail the operation of the software.   PDF files are opened by clicking on the appropriate buttons.   A PDF Reader must be installed on the computer.

The Help screen is available at all times.

Figure 13-1 : Help Screen

CHAPTER 14
EXIT

Use this button to quit from the software.   An active sounding must be terminated before the software is closed down.

APPENDIX A :   READY TO LAUNCH TESTS

Listed below are the tests carried out following the Ready To Launch stage.   Unless indicated, should any of the tests below fail, an error dialog box will be displayed, and the operator will be prevented from proceeding.   The alternative is that a warning is displayed, and the operator is given the option to proceed or not.

Equipment check

The attached equipment must have already replied to a query for its model (i.e identity).   This will allow the software to confirm that the attached equipment is the same type as was set up in the Communications | Antenna form.   This is a 2-stage check – first that some reply has been received from equipment, and secondly that it matches the expected equipment.   *(ERROR given)*

Built-In test result from the equipment are interrogated and flagged if they are a problem.   *(ERROR given)*

Data Check

For non-linked equipment (iMet-3050 and iMet-3150), confirm that some data has been received on the data input channel.   *(ERROR given)*

If pressure, temperature and/or humidity are expected from the radiosonde, confirm that at least one valid PTU data packet has been received.   *(ERROR given)*

If GNSS data is expected from the radiosonde, confirm that at least one valid GNSS data packet has been received.   *(ERROR given)*

Test pre-2007 BAT-16 radiosondes for excessive crystal drift.   *(ERROR given)*

Test that, if using an iMet-2000/iMet-1500 antenna, the Local CDU lockout function is turned off. *(ERROR given)*

The Current Weather data should not be older than the configured time (in Operational Preferences) *(ERROR given)*

The tests below check the values of pressure, temperature and humidity.   If the radiosonde provides any of these three values, sufficient samples (20) should have been received (in order to create and average) before proceeding.   *(ERROR given)*

If the radiosonde provides pressure, check that it has not varied by more than 1hPa over the 20 second moving average.   *(WARNING given)*

If the radiosonde provides pressure, check that it does not vary by more than 0.8hPA from the determined Launch-level air pressure   *(WARNING given)*   Note : It is necessary to prevent the possibility of Significant Levels occurring "below ground level" (i.e. at a reported pressure higher than the Launch Level pressure).   To this end, all pressure readings from a radiosonde that reports higher than Launch Level pressures at launch are scaled.   This is to ensure that they read the same Launch Level pressure as was determined from the Current Weather pressure entry, Station Details barometer altitude and Station Details launch altitude.

If the radiosonde provides pressure, check that it does not vary by more than 0.8hPA from the determined

Launch-level air pressure   *(**WARNING** given)*

If the radiosonde provides GNSS altitude, check that it does not vary by more than 20m from the Launch Altitude, as entered under Station Details. *(**ERROR** given)*

If, with a tracking antenna and GNSS radiosonde in GNSS tracking mode, the radiosonde is found to be more than 200m away for a local launch, the option is given to abort the launch. *(**WARNING** given)*

APPENDIX B :   ERROR MESSAGES

Listed below are a number of the more commonly encountered error messages, grouped in the screens/operations in which they might be found.   Extra explanation is given where this may be of benefit. In general, the use of "??" in the error messages below implies a substituted number or word/s

1.1 General

- *This program requires a screen height of at least 720 pixels.*

- *This program requires a screen width of at least 1024 pixels.*

- *This software installation is faulty and will now be shut down.*
  Reason:
  ??

- *The application could not create or access the folders needed for correct operation.*
  It will now be shut down.

- *The application could not create or upgrade the database.*
  It will now be shut down.

- *This flight is busy.*
  Its status is "??".
  Abort or terminate this operation before closing the program.

3.2 Communications and general comms-related operations

- *The COM port/s for the ?? is/are invalid.*

- *There is a clash between the COM port/s for the ?? and the ??.*

- *The UDP receive port number must be above 1023 and below 65536.*

- *Invalid UDP transmit port number.*

- *A username must be specified for logging on to this STMP server.*

- *A password must be specified for logging on to this STMP server.*

- *A default To-address must be specified for emails.*

- *A default subject line must be specified for emails.*

- *Invalid email setup.*
  Either include "[msg]" within the Default Body of the email or select that the met message be included as an attachment to the email.

- *The Default From address is an invalid email address.*

- *COM??, which has been selected for the ?? interface, is not available.*
  It is probably in use by another program.

Close that program to use this COM port, or configure for operation with a different COM port.

- *The ?? COM port has been disconnected.*
  Reconnect as soon as possible

3.3 Display Preferences

- *There is an error in the ??.*

  The indicated entry is invalid (e.g. not a number, out of acceptable range, missing, containing invalid characters, etc)

- *The minimum ?? must be less than the maximum ??.*

- *There is an error in the range of the ?? temperature.*
  It must be in the range of ?? to ??

3.6 Operational Preferences

- *The specified location for sounding data does not exist.*

  The selected data folder was not accessable.   Choose another location for storing data, or check that the PC has access to the selected folder.

- *Invalid maximum length of a sounding name.*
  The value must be in the range of 4 to 20 characters.

- *The Sounding name format is invalid.*

  If the sounding name is to be auto-generated, a valid entry should exist in the sounding name format.   If the sounding name is not auto-generated, but something has been entered for the sounding name format, it should be valid.

- *Invalid weather validity time figure.*
  The value must be in the range of 1 minutes to 720 minutes.

- *Invalid UTC Time offset figure.*
  The value must be in the range of -12.0 hours to +12.0 hours.

3.7 Default Message Setup

- *Invalid value for ??*

  The indicated entry is invalid (e.g. not a number, out of acceptable range, missing, containing invalid characters, out of order, etc)

- *There was an error reading the Height Levels*
  (Check the regional number formatting settings.)
  Default Height Levels have been used.

  Potentially corrupted configuration data.   Default values will be used.

4.1 New Sounding

- *The original sounding could not be renamed.*
  Another program may be accessing the folder ??

- *The sounding name "??" is a reserved name, and may not be used.*

- *The given sounding name is invalid.*
  Note that it may not contain any of the following characters:\n/*?<>:"/

- *The existing sounding (or folder), "??", could not be erased.*
  Another program may be accessing the sounding data.

- *Unable to create a new sounding named "??".*
  A folder could not be created for the storage of the sounding data.

4.3 Select / Confirm Radiosonde

- *Specify the type of research instrumentation before continuing*

- *The radiosonde serial number must be entered.*

  Certain radiosondes required manual entry of the serial number for record-keeping purposes, as this is not provided as part of the telemetry data from the radiosonde.

- *Load the configuration data for the research instrument/s before proceeding.*

4.4 Balloon Train

- *Invalid expected ascent rate.*
  The value must be in the range of ?? ??/min to ?? ??/min.

  The user has entered an invalid value

- *Invalid balloon weight (mass).*
  The value must be above 0 ??

  The user has entered an invalid value

- *The balloon age must be filled in.*

4.5 Station Details

- *Station location information has not been provided.*
  Please fill this in.

  The user has neglected to fill in a required entry.

- *The ?? must be filled in.*
  Or
  A ?? must be provided.

  The user has neglected to fill in a required entry.

- *There is an error in ??.*

  The user has filled in an invalid or illegal value for the indicated entry.

- *Latitude, longitude and altitude must be correctly filled in.*

  Latitude, longitude and altitude entries appear to have been missed/ignored.

4.6 Messages Setup

- *Invalid value for ??*

  The indicated entry is invalid (e.g. not a number, out of acceptable range, missing, containing invalid characters, etc)

5.1 Current Weather

- *There is an error in ??*

  The user has entered an invalid value

- *Invalid ??*

  The user has entered an invalid value

- *The Automatic Weather Station ground values are unknown or unavailable.*

5.2 Ready To Launch

- *The identity of the station equipment has not yet been confirmed.\nPlease check connections and configuration.*

- *The expected equipment (??) was not found.*
  A ?? was identified instead.
  Please check and correct this error.

- *Unable to proceed.*
  No communications have been received from the antenna.
  Check that the radiosonde and antenna are operating correctly.

- *Unable to proceed.*
  No radiosonde PTU data (or invalid radiosonde PTU data) has been received.
  Check that the radiosonde and SPS/receiver are operating correctly.

- *Unable to proceed.*
  No radiosonde GNSS data has been received.
  Check that the radiosonde and SPS/receiver are operating correctly.

- *This radiosonde has a frequency calibration that is out of specification.*
  It should not be used.
  Please return this radiosonde to the manufacturer for full replacement.

- *Unable to proceed.*
  "Master" mode has been selected on the Local CDU.
  This means that this PC has been locked out from having control of the antenna.
  Use the Local CDU to disable this mode before proceeding with the launch.

- *The "Current Weather" was entered more than ?? minutes ago.*
  Please confirm the "Current Weather" details before activating "Ready To Launch".

- *Insufficient radiosonde ?? readings have been received.*
  ?? readings are required before the launch can proceed.

  Wait some time until the required number of readings have been received by the software before proceeding.

- *The radiosonde has already been operating for ?? minutes.*
  Should the sounding continue with this radiosonde?

  Make a decision as to whether the radiosonde is considered to have sufficient battery power remaining for the sounding.

12.3.6 De-archive Sounding

- *Files in the existing sounding named "??" could not be deleted.*
  The sounding has not been restored from the archive.

- *The archive entry for sounding "??" is corrupt.*
  It may not be extracted.

- *Sounding "??" could not be successfully extracted from the archive.*

- *The selected sounding has the same name as the current sounding.*
  The selected sounding has not been restored from the archive.

12.3.7 Delete Archived Sounding

- *Unable to delete the archived sounding "??"*
  Another program may be accessing the archive file.

During message generation

- *BUFR TableB reference ?? unsupported.*

- *BUFR TableD reference ?? unsupported.*

12.5 Access Control

- *Invalid current password*

- *Unknown user and/or password*

- *Invalid new password.*
  - A password must comprise at least 6 characters.
  - The password must be correctly typed twice.

- *This user could not be accepted.*
  ?? must be filled in.
  Or
  ?? is invalid

- *Only the ?? may edit the "??" user..*

  Limitations on editing of administration-level users

- *The "??" user may not be deleted*

  An Administrator user must always be present.

- *The currently signed-on user may not be deleted*

APPENDIX C :   RESEARCH RADIOSONDE USAGE

EN-SCI ECC Ozonesonde

Preparation

An ozone radiosonde configuration software program, which works in conjunction iMetOS-II, is available from InterMet. This program assists with the preparation and recording of measurement data that is necessary before using an EN-SCI ECC ozonesonde in a flight.   Contact your supplier for details.

Prepare the ozone radiosonde configuration file using the ozone preparation software.   The data collected corresponds to the procedures that are described in the ozonesonde user manual.

Below is a figure that shows the program screen. The timer in the lower left corner is provided to aid with timing of the procedures.
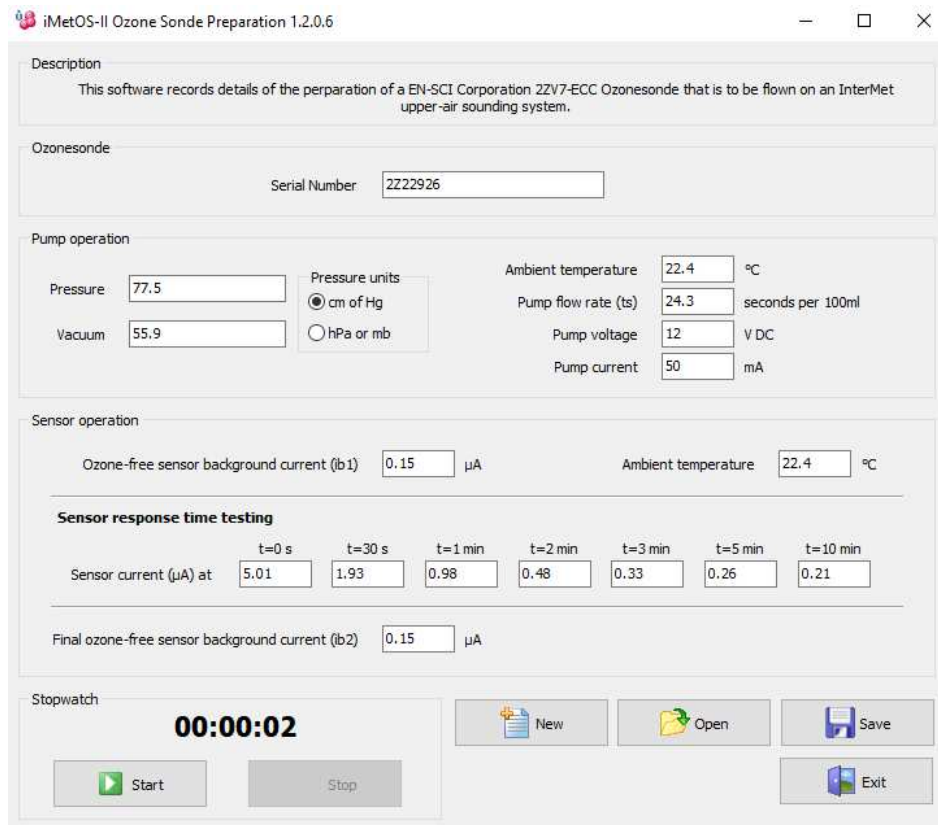

On completion of the preparation phase, use the Save button to store the data to a named file. Do not change the folder location of the file.

Usage in iMetOS-II

When flying an ozonde radiosonde, an XData-enabled radiosonde (e.g. iMet-1-RSB, iMet-2-AR or equivalent) should be selected, as detailed in Section 4.3, above.

Under the "Research" section, as shown in Figure 4-6, select the EN-SCI ozonesonde. If further instrumentation is to be used, they should be selected in the correct index order. In the example below, only an ozonesonde is attached.
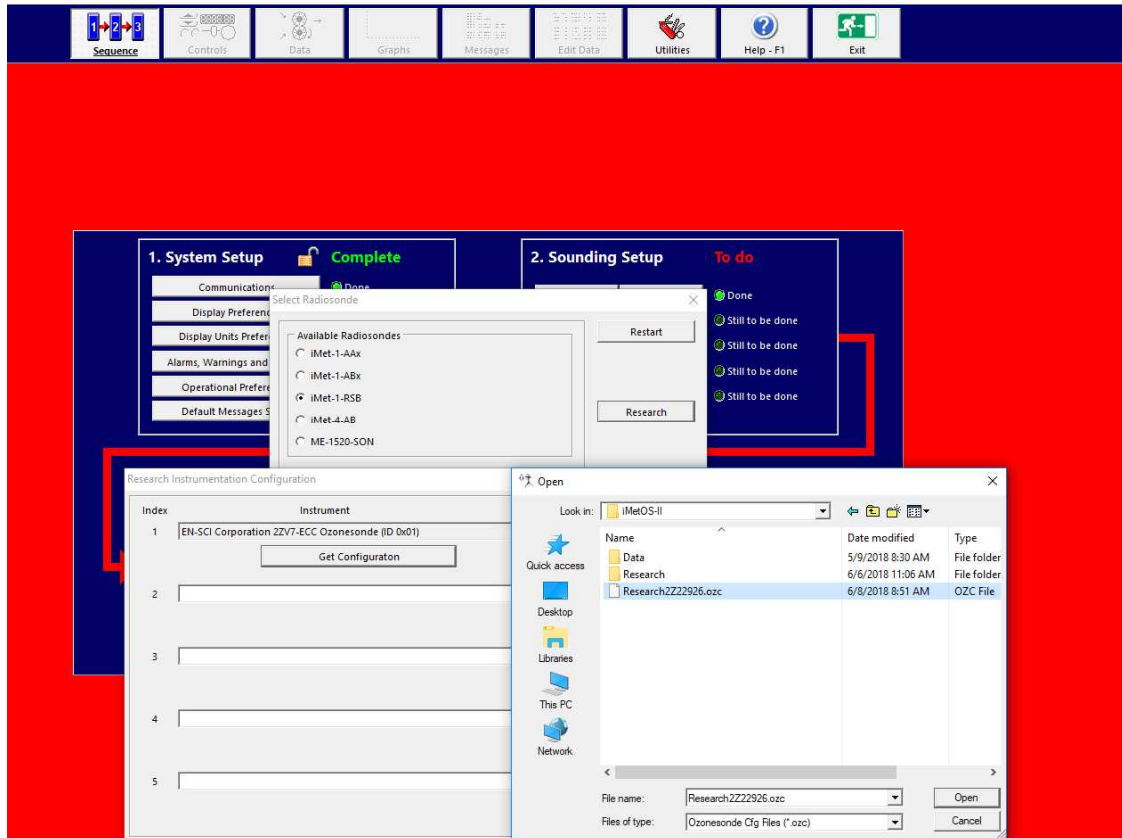

Following selection of an ozoneradiosonde, the configuration data, as recorded in the above program, should be loaded.   Use the "Get Configuration" button to select the correct previously-saved ozonesonde configuration file.   Following retrieval of the configuration data, the form should appear as shown below.
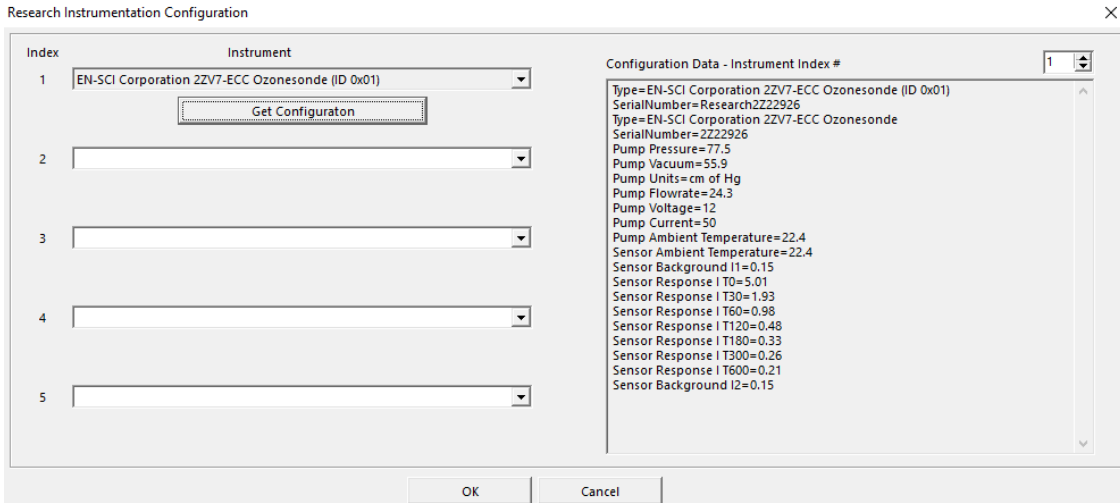
While the radiosonde is operational (i.e. before and during the sounding), live raw and interpreted numerical ozonesonde data may be viewed under the Data / Research Data screen.

During and after the sounding, ozone concentration may be viewed graphically in the Graphs / Ozone screen, as shown below
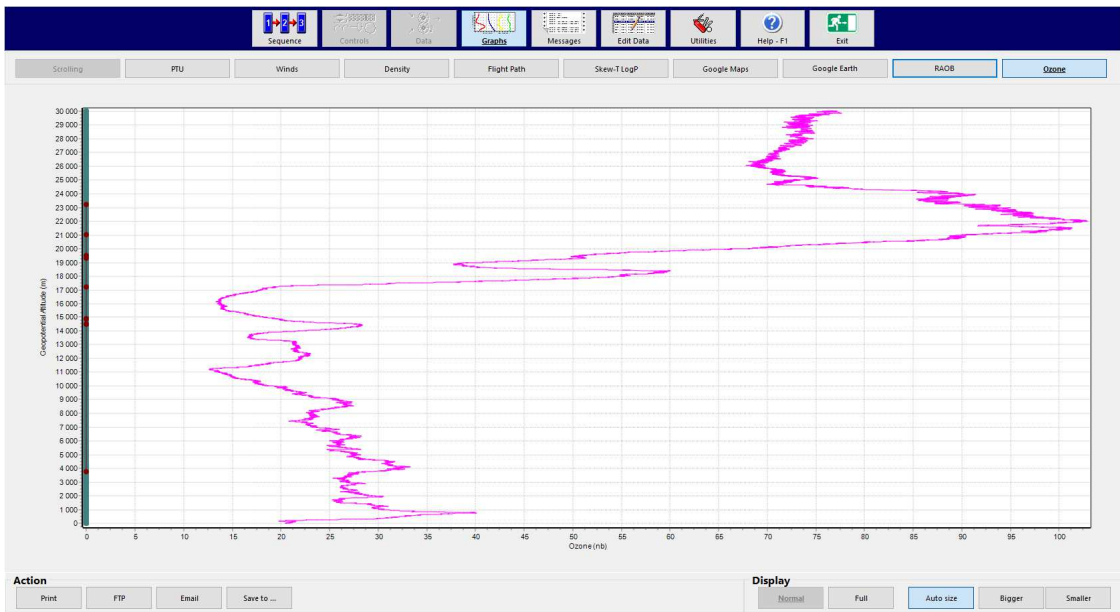
During and after the sounding, ozone partial pressure is available as a column value for inclusion in tabular reports.   These are configured in Default Message Setup, as detailed in Section 3.7.

APPENDIX D : METEOROLOGICAL MESSAGE REFERENCES

TEMP : A standard message with the default file name "<Sounding>_TEMP.txt". Refer to the FM-35, FM-36 and FM-38 messages detailed in the WMO Publication No. 306 Volume I.1 – Part A, available at

http://www.wmo.int/pages/prog/www/WMOCodes/WMO306_vI1/VolumeI.1.html

PILOT : A standard message with the default file name "<Sounding>_PILOT.txt". Refer to the FM-32, FM-33 and FM-34 messages detailed in the WMO Publication No. 306 Volume I.1 – Part A, available at

http://www.wmo.int/pages/prog/www/WMOCodes/WMO306_vI1/VolumeI.1.html

Standard Levels : A user-customisable, tabular message presenting data lines at specified pressure levels. The default file name is "<Sounding>_STDLVLS.txt"

Refer to http://glossary.ametsoc.org/wiki/Mandatory_level

Also refer to Section 32.3.1.1 in the above WMO document

Significant Levels : A user-customisable message with the default file name "<Sounding>_SIGLVLS.txt". Refer to http://glossary.ametsoc.org/wiki/Significant_levels

Also refer to Section 32.3.1.2 in the above WMO document

Time Interval : A user-customisable, tabular message presenting data lines spaced by a specified time interval. The default file name is "<Sounding>_TSPOTINT.txt"

Height Interval : A user-customisable, tabular message presenting data lines spaced by a specified altitude interval. The default file name is "<Sounding>_HSPOTINT.txt"

Height Levels : A user-customisable, tabular message presenting data lines at specified altitude levels. The default file name is "<Sounding>_HLPOTINT.txt"

BUFR Message : A standard message with the default file name "<Sounding>_BUFRxyyzzz.bufr" where "xyyzzz" is the BUFR table number. Refer to the FM-94 messages detailed in the WMO Publication No. 306 Volume I.2 – Part B, available at

http://www.wmo.int/pages/prog/www/WMOCodes/WMO306_vI2/VolumeI.2.html

METCM (STANAG 4082), METB2/METB3 (STANAG 4061), METTA (STANAG 4140), METFM,

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METSR :

Standard messages with the default file name "<Sounding>_XX.txt" where "XX" is the MET id.

Refer to the appropriate section in FM 3-09.15 "Tactics, Techniques, And Procedures For Field Artillery Meteorology"

http://www.globalsecurity.org/military/library/policy/army/fm/3-09-15/fm-3-09-15.pdf

SHARPpy :

https://github.com/sharppy/SHARPpy

Summary : A summary report of the sounding, with default file name is "<Sounding>_SUMMARY.txt"

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